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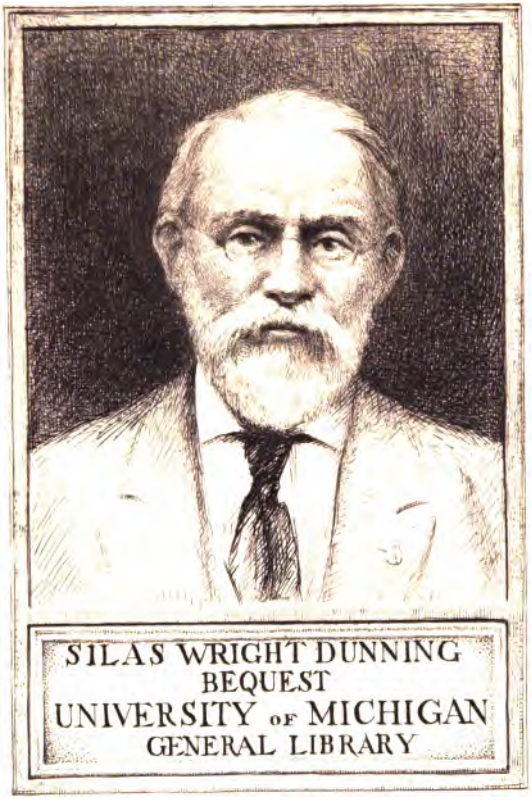

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THE

TRANSACTIONS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

FROM JUNE 1860 TO DECEMBER 1862.

(EDITED BY THE SECRETARY.)

VOLUME XVI.

Bombay:
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RULES AND REGULATIONS.

1*st.*—This Society, established for the purpose of encouraging and instituting Geographical researches in Western Asia, and the countries contiguous, is denominated the "Bombay Geographical Society."

2*nd.*—The Society shall consist of Honorary and Ordinary Members.

3*rd.*—Every candidate for admission, whether as an Ordinary or Honorary Member, must be proposed and seconded at one Meeting of the Society, and balloted for at the next.

4*th.*—No person shall be considered duly elected, unless he unite in his favour the votes of three-fourths of the Members present.

5*th.*—An Annual Subscription, amounting to Rs. 15, to be paid by all Members in advance, on the 1st of April of each year.

6*th.*—Members may compromise, by a single payment of Rs. 100, instead of a payment of Rs. 15 annually.

7*th.*—*Of the Office-Bearers and Committee.*—The Office-Bearers shall consist of a President, a Secretary, and Treasurer,—permanent; three Vice-Presidents, and a General Committee of Management (consisting of 20 Members), to be chosen annually.

8*th.*—That the Committee of Management and other Office-Bearers of the Society eligible annually, shall be chosen by general vote of the Ordinary Members, to whom voting lists shall be forwarded three months previous to the Anniversary Meeting, at which the returns shall be scrutinised and announced.

9*th.*—Two Sub-Committees, consisting of six Members each, shall be annually selected from among the Resident Members of the General Committee, at the first meeting after the annual election of the latter. The Sub-Committee having the supperintendence of all the internal management, accounts, &c. of the Society, shall be denominated the "Sub-Committee of Accounts:" the other shall conduct the correspondence of the Society, and suggest plans for attaining its scientific objects —to be called "The Sub-Committee of Correspondence."

10*th.*—The Secretary shall be a Member of the Committee of Management *ex-officio*.

11*th.*—Each Sub-Committee can meet independently of the other for the purpose of discharging the business especially entrusted to it; and the meeting shall be summoned by a circular from the Secretary.

12*th.*—The Sub-Committee of Accounts shall lay before the Annual General Meeting, to be held in May or April of each year, the state of the Society's Funds. The Sub-Committee of Correspondence shall lay before the same Meeting a list of the Scientific Contributions made to the Society during the year.

13*th.*—Each Sub-Committee shall elect, from among its Members, a President to preside at its Meetings.

14*th.*—The President shall preside at the General Meetings of the Society, to conduct the Proceedings, and give effect to the Resolutions.

15*th.*—The Vice-Presidents shall preside at the General Meetings in the absence of the President, and in rotation at Meetings of the General Committee of Management.

16*th.*—The Secretary shall attend the Meetings of the Society and those of the Committee, to record their proceedings and conduct the correspondence. He shall also superintend the persons employed by the Society, and under the control of the Committee for managing the accounts, shall superintend the expenditure of the establishment.

17*th.*—The Treasurer will receive, through the Secretary, all moneys due to the Society, and make payments out of the funds of the Society according to the directions of the Secretary.

18*th.*—The Society shall meet on the third Thursday of every month, at 4·30 P.M.

19*th.*—Notice shall be given, either at a previous Meeting or to the Secretary, of any motion or subject of discussion intended to be brought before the Meeting, at least one week beforehand; and all matters of business, &c. intended to be brought before the Society, shall be notified to the Members by printed circulars.

20*th.*—Each Member may introduce a friend to all ordinary Meetings of the Society.

21*st.*—The Society shall present copies of its transactions to the principal Public Libraries in India, Europe, and America; and exchange them with Societies, and with such Authors or Publishers as may be disposed to bestow works of equivalent value, or nearly so, on the Library of the Society.

22*nd.*—All Members of the Bombay Branch of the Royal Asiatic Society are entitled to be admitted Members of the Geographical Society, on making application to this effect through the Secretary, and paying the prescribed annual subscription.

LIBRARY REGULATIONS.

The following are the Rules in force for the Management of the Library:—

1. The Books of the Geographical Society's Library may be taken out by Members, subject to the following exceptions and restrictions.

2. No Book shall be delivered out by the Librarian, unless the Member requiring it shall either sign the entry in the Register, or send a receipt to him.

3. No Member shall keep any Book longer than fourteen days.

4. Any Member requiring a Book which has been delivered out, may insert, or cause to be inserted, his name in a Register kept for that purpose; and it shall be the duty of the Librarian to apply for it as soon as the period specified in the above rule has expired, and, on receipt, to forward it to the first on the list of applicants, if there be more than one.

5. Not more than three Volumes to be taken out at one time by any Member.

6. The Librarian shall inspect carefully every Book at the time it is returned, and, if damaged, shall report the circumstance to the Secretary.

7. Any Book lost or damaged shall be charged to the Member in whose name it stood in the Register, at the invoice price, or such price as shall be fixed by the Committee of Management.

8. Members leaving Bombay, are required to return, before their departure, to the Library, all Books belonging to it in their possession, and no Book shall be carried out of Bombay.

9. No Map, Chart, Atlas, or Book of Reference, shall be taken out without express permission from the Committee of Management, except Books of Reference (for 48 hours) on the order of the Secretary to that effect.

10 Any Member may propose Books, Charts, Maps, or Atlases, to be added to the Library, by inserting their names in a Register kept for that purpose, and they will be ordered or not as the Committee may deem expedient.

11. Every new Work, Map, Chart, &c. shall lie on the table one month before it is taken out.

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(ESTABLISHED IN 1832.)

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(To December 1862).

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„ The "Bombay Guardian."
„ The "Times of India."
„ The "Bombay Saturday Review.
Calcutta, Asiatic Society of Bengal.
„ Director of Publicl nstruction.
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tation to become its Patron. It was also stated that the 15th volume of the Society's Transactions would be ready for issue in a few days.

The Paper read was, "Particulars concerning the Runn of Kutch and the country on its Southern margin." By Lieut. C. D. Dodd. Communicated by Government.

The President said: Our thanks are due to His Excellency the Governor in Council for sending to us this interesting communication. The section of country described by Lieut. Dodd presents peculiar physical features, and coupled with the alternate upheavals and depressions known to have taken place in its vicinity and extending to the Indus, gives the investigation of this subject very great interest.

Captain Barker observed that places within the Delta of the Indus had at one time been close to the sea, as proved by portions of a foreign vessel having been found imbedded in the soil at a place some distance inland. Mr. Kennelly said, that while upheaval formed the principal feature of the Kattywar and Sind Coasts, on the North, depression would seem, on the other hand, to exist, in particular, on the Southern or Malabar Coast, as instanced by the total submersion of the old Town of Calicut. Evidences of the same nature are observable at Cochin and at other places along this coast. The question of alternate upheaval and depression along the whole Western Coast of India is such, from its interest, as to cause of late a renewed investigation of the subject, particularly in relation to earthquakes.

The President, before adjourning the Meeting, said, that it gave him pleasure to state that Commander Constable's Chart of the Persian Gulf had been completed, and from the care taken in its execution, it would, he had no doubt, be valuable to remedy the defects known to exist in the former Gulf charts.

The deep-sea sounding also along the coast, south from Bombay, has been finished by Lieut. Forster, and it is intended that Lieut. Williams will, in surveying the Hubshee's coast territory during the approaching season, complete the coast triangulation. Wadges Bank, also, from its position so useful to ships making the southern coast of India, will be carefully surveyed by the same Officer. Lieut. Forster proceeds up the Northern India for the purpose of making a more accurate survey of that river, and he (the President), had no doubt but that much useful information would in consequence be afforded to the Society.

SESSION 1860-61.

SECOND MEETING.—*October 18th*, 1860.

Present.—Commodore G. G. WELLESLEY, C.B., R.N., *President*, in the Chair; Captain W. C. Barker, I.N., *Vice-President.*

Members.—Lieut. W. M. Pengelley, I.N.; C. D. Leggatt, Esq.; G. C. M. Birdwood, Esq., M.D.; J. M. C. Erskine, Esq., C.S.; J. E. C. Pryce, Esq.; Mirza Ali Mahomed Khan, Esq.; Colonel G. H. Robertson, C.B., A.D.C. to the Queen; Munmohundas Davidass, Esq.; Virjeevundass Mahadowdass, Esq.; Venayek Rao Juggonathjee, Esq.; and D. J. Kennelly, Esq., *Secretary.*

On taking the Chair the President said,—

"It has been the general custom of this Society on the removal, by death, of any of the more distinguished of its Members, that the matter was adverted to from the Chair before the Minutes were read."

Moved by the President, and seconded by Mirza Ali Mahomed Khan, Esq.

"That before proceeding with the business of the day, the Society record its deep sense of regret at the demise of Dr. Buist, one of the oldest members of the Society, who, for many years, had been its Secretary, and whose anxiety to promote the Society's objects, and to advance its interests, continued unvaried to the close of a valuable life." Unanimously agreed to.

The Minutes of the last Meeting were read, and approved.

Elections.—Captain James Frushard, I.N.; Lieut. H. Morland, I.N.; A. Dando, Esq., I.N.; and Byramjee Jeejeebhoy, Esq.

Member Proposed.—Lieut. P. W. Mitcheson, I.N., proposed by the Secretary, and seconded by Lieut. W. M., Pengelley, I.N.

Donations.—Among the many valuable donations were the following:—

1. Journal of the Royal Asiatic Society of Great Britain and Ireland, Part I. of vol. 18. By the Society.
2. Journal of the Royal Geographical Society, vol. 29. By the Society.
3. Proceedings of the Royal Geographical Society of Great Britain and Ireland, Nos. 2 and 3 of vol. 4 of 1860. By the Society.

4. Journal of the Indian Archipelago, and Eastern Asia; New Series, Part I. Vol. 3. By Government.

The 15th volume of the Society's Transactions having been laid on the table, it was proposed by Venayek Rao Juggonathjee, Esq., and seconded by Mirza Ali Mahomed Khan, Esq.,—

"That the best thanks of the Society are due to the Secretary for the able manner in which he has edited their Transactions, now issued."

The Secretary then read a memorandum on the "Eastern portion of Kutch, called Wagur," by Lieut. C. D. J. Dodd, late Adjutant of the Kutch Levy; also a few remarks on the passage from Sydney to Booby Island through Torres Straits, *vid* the Great North East Channel of Bligh's Entrance. Also, journal of a trip from Sydney through Bligh's Passage, made by the merchant ship *Medway*, as follows:—

A few remarks on the Passage from Sydney to Booby Island through Torres Straits, vid the Great North East Channel by Bligh's Entrance.

"*July 1st* 1860.—The *King Lear*, 1970 tons register, sailed from Sydney, her destination being Bombay. Prior to leaving England, it had been determined, in the event of the ship having to search for freight in India, to take the Torres Straits passage by what is now termed the Great N.E. Channel, and accordingly the most recent Admiralty Charts and directions were procured, and as nothing but a General Chart on a very small scale for the Coral Sea, and that portion of the sea leading down to the Eastern Fields reefs, could be procured in London, charts of a suitable scale were constructed roughly on ship board, during the passage from England to Sydney, and that portion of the Coral Sea which had recently been surveyed by H.M.S. *Herald*, Capt. Denham, R.N., including all the reefs whose positions had been accurately determined, were laid down thereon. Further information collected in Sydney during our stay there, respecting that portion of the sea with only Flinder's two solitary tracks thereon as far as the Eastern Fields (and which the 2nd vol. of the Directory alludes to, as being very imperfectly known, and requiring consequently great care and vigilance whilst passing through it), inspired me with additional confidence as to the route I had chosen, being free from dangers, as I was assured by gentlemen whose veracity I could not question, that although the Admiralty directions suggested great caution, yet that the sea hereabouts had been very much cut up by whalers year after year, to which loca-

lity they resorted at certain seasons in search of sperm whales, and that I might fearlessly steer on past the Eastern Fields. Fortunately during our stay at Sydney, the *Herald* arrived there, May 24th 1860, from another surveying course in the Coral Sea, and to Raine Island, thus completing the survey from Sydney to Raine Island. Directions were published and courses given to reach Raine Island, everything so succinctly stated. I almost wavered in my determination, and felt disposed to take the beaten track to Raine Island. A further reference however, to the beautiful Admiralty Chart I possessed of the N.E. Channel decided my choice, and off we started (July 1st). For four days we were struggling with light airs and calms, and on July 5th only found ourselves 200 miles E.N.E. from Sydney Heads. From this position after a brush of thunder, lightning, and rain, a gentle breeze from the S.W. to S.E. force 2 to 3, took us down to 22° S. lat., 157° E. long., in which position we were (July 11th) at noon, and nothing to note saving the appearance of a comet observed nightly from the 6th July in the W.N.W. true, and two whalers on the 11th July; little N. Westerly current during the two latter days. From the 11th to the early part of 13th, winds prevailed from W.N.W. to the south with unsettled cloudy weather, and a very high S.E. swell. At noon on the latter date, we were in lat. 17° 44′ and long. 155° 16′ E., and had fairly found the S.E. trades; from this position we steered by compass N.W. ¾ W. until 11 P.M. on the 16th July, making a surprisingly straight course, the bar, as determined daily by our prismatic compass, corresponding very closely with that found on the Admiralty Chart, and which consequently gave me much confidence in the courses we had to steer. Our days' runs from the last position were respectively 225, 215, and 208 knots—weather peculiarly hazy and the night very gloomy, no land discernible. At 2 P.M. 16th, checked position by Summers' method, and again by Alphecca', after which the night became so gloomy and overcast, that no stars were visible; at 11 P.M. altered course to W.½ N. by compass, being then in lat. 9° 23′ S., long, 145° 50′ E. During the night we had strong winds and were making 11 to 12 knots, and at 7 A.M. July 17th, we saw the breakers on East Cay. We continued our course W. ½ N., and at 8 A.M. Anchor Cay bore south 3 or 4 miles distance; continued on the same course, and at 8·30 A.M. saw Darnley Island. After bringing the Island to bear S. by W. ½ W., and having seen the reefs wash about a mile to the south of us, we hauled up for Stephens Island, the wind at the time S.E. to S.S.E.; being

well to windward and the weather very hazy, we did not see Bramble Cay at all. Soon after entering the channel the clouds began to detach, and the sun to break out, causing very rapid changes in the colour of the water, look-out exclaiming discoloured water ahead, abeam, &c.; this I was fully prepared for, as it had been very distinctly mentioned in the Directory. We prosecuted our course to the S.W., passing successively the islands on the way like so many finger-posts, and by 4 P.M. we were close up to Dove Islet, but could not pass to windward of it, so tacked and worked up under the lee of an island (not named), bearing E. by N. from Dove Islet, and anchored at 6 P.M. in 14 fths., 1¼ miles distant from the shore. We saw a few scattered natives on all the islands on the way, and a few miserable huts on the point of the island under which we were anchored, and a few canoes.

"On the 18th we remained at anchor, as the winds were variable and squally from the S.S.E. and South: the ship *Storm Cloud* came up to and anchored near us, having taken the channel yesterday, about four hours after ourselves, and had anchored under Rennel's Island. Early on the 19th the wind being S.E. we commenced to heave short, and by 6·30 A.M. both ships were under weigh with a fine stiff S.E. wind. We quickly rounded Dove Islet, and we steered away direct for Bet Islet, which we passed at 8·35 A.M. and the Ninpin Rock at 9·15 A.M., from which position we steered S.W. ¼ S. for the Prince of Wales Channel. It was whilst steering this course, that both ships passed a reef not laid down on the charts, particulars of which the Master Attendant of Bombay has been supplied with from the "K. L." Both ships were through the Prince of Wales Channel by 12·30 P.M., and anchored at Booby Island at 1·30 P.M., having come from our anchorage in 7½ hours, a distance of 80 miles. Captain Campbell of the *Storm Cloud* and myself went on shore to inspect the records at the P. O., and after mutual congratulations in respect to our late passage through the Straits, the next question mutually asked was, did you see the reef? By inspection of our charts we had both placed it in the same position.

"Captain Campbell on a previous voyage had been through Raine Island passage, but now says,—'after having come through the easily navigable N.E. Channel, I will never attempt the anxious Raine Island passage again.' For my part I have never been through Raine Island passage, and cannot therefore judge by contrast, but most cheerfully subscribe to the ease and safety with which the former may be navigated, free from sunken reefs (excepting probably the one discovered by ourselves)

as well as the glare of the post-meridian sun. A vessel may push her way onward until dark, and then find anchorage almost any where along the route, and at times may even pass through the entire length of the channel without having occasion to anchor at all, as was the case with the *Castilian*, Captain Harrington, which passed through a month later than we did, passing Bramble Cay at 8 A.M.; he proceeded S.W., and the same evening at 7 P.M. anchored under Mount Ernest through Raine Island passage: such a feat could not be accomplished under the most favourable circumstances.

W. S. CROUDACE."

After a conversation of a general nature on the subject of the last Paper, it was stated by Mr. Kennelly that, although the Raine Island passage through Torres Straits had been the longest known, and hitherto the most frequented by ships passing into the Indian Ocean, yet he felt no doubt that the more easy and expeditious passage of Bligh's would eventually form the chief, if not the only channel through which ships shall pass, whether from Australia to India, China, &c. &c., or *vice versâ*. He stated this from personal observation, having run through both passages, and felt confident that from the simple and easy navigation of this route, and when from use it shall become more generally known, the present high rates of Marine Insurance effected on ships to pass through Torres Straits will become considerably decreased.

The thanks of the Society having been voted to the Government and other contributors, the Meeting adjourned to 15th November.

SESSION 1860-61.

THIRD MEETING.—*November 15th*, 1860.

Present.—Commodore G. G. WELLESLEY, C.B., R.N., *President*, in the Chair; The Honorable W. E. Frere, Esq., C.S., and Captain, W. C. Barker, I.N., *Vice-Presidents*.

Members.—Dr. Birdwood; Rev. W. K. Fletcher, M.A.; Mungul-dass Nuthoobhoy, Esq.; Captain James Frushard, I.N.; and D. J. Kennelly, Esq., *Secretary*.

The Minutes of the last Meeting were read and approved.

Elections.—Lieut. P. W. Mitcheson, I.N.

"3rd.—After a succession of hot sultry weather and calms to find the land exceedingly clear, the clouds over it rolled up in a scroll-like form, sun's rays casting a supernatural glare, although the sky may be very clear to all appearance.

"4th.—A deep lurid red tinge of the clouds or sky opposite to the setting sun (this of course coupled with foregoing).

"5th.—By night.—Stars large and brilliant, with incessant twinkling, caused probably by a thin film of vapour rapidly passing. (I have never found or heard of a Typhoon being preceded by thunder, although I have heard claps of thunder when it was taking its leave.)

"6th.—An obscured sun at sunrise, with an otherwise clear sky, on an easterly bank at night.

"During the months, latter end of May, June, July, August, September, and part of October, the mariner ought always to be on the watch in those seas. Even in November and December rotatory gales have happened."

A vote of thinks having been passed to Mr. Dando and to the other donors, the Meeting was adjourned to the 21st February.

SESSION 1860-61.

SIXTH MEETING.—*March* 21st, 1861.

Present.—Commodore G. G. Wellesley, C.B.R.N., *President*, in the Chair; the Honorable W. E. Frere, C.S., and Captain W. C. Barker, I.N., *Vice-Presidents.*

Members.—Dr. G. C. M. Birdwood, M.D.; Dr. Bhawoo Dajee; Venayekrao Jugonnathjee, Esq.; Rev. J. Carlile; C. D. Leggatt, Esq.; A. C. Dando, Esq.; Rao Saheb Wishwanath Narayen Mandlik; and D. J. Kennely, Esq., *Secretary.*

Donations.—Among the donations were the following:—

1. Magnetical and Meteorological observations made at the Government Observatory, Bombay, in the year 1859. By Government.
2. Ansprache gehalten am Schlusse des Ersten Decenniums der Kaiserlich-Koniglichen Geologischen Reichsanstalt in Wien A.M. 22 November 1859.
3. Die Fossilen Mollusken des Tertiær, Beckens von Wien.
4. Jahrbuch der Kaiserlich-Koniglichen Geologischen Reichsanstalt. 1859 X. Jahrgang No. April, May, June.

5. Jahrbuch der Kaiserlich-Koniglichen Geologischen Reichsanstalt. 1859 X. Jahrgang No. 3 July, August, September.
6. Jahrbuch der Kaiserlich-Koniglichen Geologischen Reichsanstalt. 1859 X. Jahrgang No. 4 October, November, December. By the German Geological Society.
7. Abhandlungen der Mathemat-Physikalischen Classe der Koeniglich Bayerischen Akademie der Wissenschaften.
8. Paper on the Thull Ghaut Railway Incline. By the Author.
9. The Fifty-sixth Report of the British and Foreign Bible Society. By the Society.
10. Annual Report on the Sind Forests for the year 1859-60. By Government.
11. Magnetical and Meteorological observations made at St. Helena, Vol. II. By the Government.
12. Greenwich Magnetical and Meteorological observations, 1858. By the Royal Society.
13. Notices of the Proceedings of the meetings of the Members of the Royal Institution of Great Britain. Part X. November 1859—July 1860. By the Society.
14. Statistical and Geographical Report of the Moorshedabad District. By the Government.
15. Africa: S.W., S., and S.E. Coasts. By the Government.
16. Three abstracts of Meteorological observations made by Assistant Surgeon J. Welsh, during the voyage of the Muscat-Zanzibar Commission to and from Zanzibar in H.M.'s steamer *Punjaub*. By Government.*

Letters read.—From J. Fyfe, Esq., Librarian to the University Library, Aberdeen; R. J. Fleming, Esq., Registrar, Queen's College, Cork; J. H. Richardson, Esq., Librarian, Queen's College, Galway; N. Jones, Esq., Librarian, University Library, Glasgow; W. North, Esq, M. S. Librarian, St. David's College; J. W. Redhouse, Esq., Secretary, Royal Asiatic Society, London; T. Black, Esq., Superintendent, P. and O. Steam Navigation Company; Dr. Med. W. Stricker, Schriftfuher; R. Belton, Esq, Registrar, Queen's College; the principal Librarian to the British Museum, acknowledging with thanks the receipt of Vol. XV. of the Bombay Geographical Society's Transactions.

2. From C. M. Harrison, Esq., C.S., and E. Impey, Esq., intimating their withdrawal from the Society.

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* See page 116.

3. From Lieut. P. W. Mitcheson, I.N., forwarding a copy of the Magnetical and Meteorological observations made at the Government Observatory, Bombay, in the year 1859.

4. From John Wright, Esq., Trincomali; the Head Assistant Collector of Tanjore, Negapatam; and R. S. Playfair, forwarding Bottle Logs.

5. From the Chief Secretary H. L. Anderson, Esq., forwarding three Abstracts of Meteorological observations made by Assistant Surgeon J. Welsh, and a pamphlet descriptive of the S.W. and S.E. Coasts of Africa.

Read also a communication from Lieut. G. T. Robinson, H.M.I.N., bringing to the notice of the Society the existence of errors in the 7th edition of Horsburgh's Directory for India, in which, at page 383, Volume I., it is stated that a Floating Fixed Light is moored in Latitude 12° 47′ N. and Longtitude 45° 06′ E., Aden Back Bay, in 20 fathoms water, whereas the correct depth is 3½ fathoms: and, again, at page 487 of the same volume the variation of the compass for Kurrachee is stated to be 11° 56′ E., while the correct variation is 55′ E. only.

Resolved, that the Secretary be directed to communicate with the Indian Naval Draughtsman, as well as the Publisher of the Directory, with a view of effecting the corrections pointed out by Lieutenant Robinson.

The Bottle Logs referred to under Letter No. 4 bear the following:—

"No. 35; this Bottle with its enclosure was thrown from on board H.M.S. '*Berenice*,' on her way from Aden to Point de Galle at Noon on the 6th March 1860, in Latitude 8° 22′ N., Longitude 69° 13′ E.

G. T. Robinson,
Lieut. Commanding."

The Head Assistant to the Collector at Tanjore, who forwarded the above, states, "Picked up at Point Calimere, close to the Light House, by a Native boatman, about the 5th February 1861." The Secretary said that no direct course could be assigned to this Log. It had been thrown from the vessel when probably making for what is called the 8° channel, and at a time of the year when the current may be said to run S.S. easterly. It would be right, therefore, to assume that this Log would pass the Gulf of Manar, and so round Ceylon to where it was picked up, after an immersion of eleven months, and the performance of a voyage of at least 1,100 miles.

"No. 5. This Bottle with its enclosure was thrown from the ship *Orissa* on her way from Bombay to Suez at noon on the 1st day of December 1860. Latitude 14° 44′ N., Longitude 53° 23′ E.

"J. W. Purchase, Commanding."

Captain Playfair, Acting Political Resident at Aden, states :—"Picked up at Zaila on the coast of Africa, on a date unknown, and sent to me by the chief of Zaila, 26th January 1861." The drift of this Log was in a direction S. 70° 44′ W. for a distance of 612 miles, and, if a period of six days be allowed for the time taken by the Chief of Zaila to forward it to Captain Playfair, the result would be a passage of 50 days at 12·25 miles per day, and traversing from the Meridian of the West end of Socotra the whole length of the Aden Gulf.

"No. 122. This bottle with its enclosure was thrown from on board H. M. S. *Berenice* on her way from Singapore to Madras at noon on the 19th December 1860. Latitude 11° 04′ N., Longitude 89° 41′ E.

"G. T. Robinson, Lieut. Commanding."

Mr. Wright, who forwards the Log from Trincomalie, states, "Found on the sea-shore at Oopoowally, two miles to the North of Trincomalie, by Nagalingen and Chinnexamby, at 2 P.M. January 29th, 1861. Bottle is brought to me in Trincomalie by the parties this the 30th day of January 1861."

This Log, thrown over in the Bay of Bengal, had, after a lapse of 41 days, voyaged a distance of 517 miles S. 73° 21′ W., and tells us what does not appear to be in agreement with the following statement made by Captain A. B. Becher, R.N., at page 53 of his Book of Directions for navigating the Indian Ocean, where it is said :—"Throughout the Bay of Bengal in the month of December there are no currents but those produced by the tide."

The Secretary further stated that, anticipating the Society's permission, he had written to eight stations in China with a view of collecting accounts of the Cyclones lately prevalent in the China and Japan seas.

Dr. H. D. Glasse having been proposed a member, the following letter from Colonel G. LeGrand Jacob, prefacing his paper, "Extract from Journal of a Trip to Sind from Kutch in 1852," was read :—

"To the Secretary of the Bombay Geographical Society, Bombay.

"My Dear Sir,—At the last meeting of our Society which I attended, I promised, when I could find time, to copy an extract from a rough Journal kept during my mission to Sind in 1852, relating to the Thurr desert; this I have now the pleasure to send you (under separate cover). Occupation, ill health, and separation from my papers have retarded its transmission longer than I could have wished.

"I was pressed for time and had no instruments with me for scientific observation, but some statistical information is given and the general geographical features of the district are noted—a very remarkable one it is—ridges of sand like the waves of the ocean in a storm, but higher and further apart, standing up from the level country around. I never more regretted my scanty knowledge of geology that I might have satisfied myself as to its origin. Lyell is, I think, the only geologist who has turned his attention to this neighbourhood—(referring to a memoir of Sir A. Burnes)—but he limits himself to a brief notice of the Runn, in itself worthy of a treatise. The sea has doubtless receded from around Kutch, but how much from general causes affecting the whole western coast of India, and how much from local change of level, remains to be investigated. Kutch must have been once an island; its very name, derived from Tortoise or Turtle, denotes its connection with the water, more perhaps than its shape. Tradition points to the time when Veeravow was a Bunder, and at the head of the present gult, the land is slowly gaining on the sea. Colonel Lang and I took advantage of this to carry through our first route reform seven or eight years ago, whereby Sind, Kutch, and Kattywar became several days nearer to Bombay. The small ports high up the gulf are becoming more and more difficult of access, but in addition to the sea receding there has been elevation from subterranean movement. I found when I was making inquiries on the subject at Lukput in 1851 that there had been extensive upheavals in the Sindee direction even so late as 1844, by a succession of shocks that lasted a month, which appear to have escaped public notice—the great earthquake of 1819 is of course well known. If the Society desire it, I can give you extracts from my journal relating to the gradual change of land and water between Sind and Kutch.

"My lamented cousin of Jacobabad, who did much for the geography of Upper Sind, appears to have formed a different opinion to myself of the Thurr desert—our respective views are given in Government compila-

tion XL. of 1856, wherein he says:—'The desert is not separated from Sind, but everywhere along the whole line the sand-hills are intricately intermingled with the alluvial soil of the Indus;' and again, 'this district is in fact not only closely connected with, but is one with Sind,' he excepts of course Parkur.

"My good cousin was rather too apt to write as he would head a charge of his own horse, and in this instance he must have done so when distracted with other subjects, as there is great misapprehension of the paper he was commenting on; the words 'everywhere along the whole line' are opposed to the facts recorded in my journal, and to what I have gathered from others. He was probably thinking of the higher portions of the desert near Oomerkot, of that part of the Sind frontier where the sand waves gradually diminishing in height and bulk merge into or mingle with the level country; be this as it may, the point is one of geographic interest that our Society would do well to clear up. Troops have occasionally marched across the desert and along the Runn, skirting it round into Sind by Raoma Bazar, and I dare say Col. Phayre, who is I believe a member of our body, could give us this information, or obtain it for us from the first intelligent observer whom he may send by these routes. It is obvious that as a basis for any decisive theory accounting for the peculiarities of this tract of country, its exact condition should be known.

"Captain Raikes, for many years its Deputy Collector, in a report dated 17th March 1853, published in same compilation, thus describes it: 'The district is one mass of sand-hills, which are higher on the western side of the district than elsewhere. I know not to what else than the waves of a troubled sea to compare them; generally speaking they run east and west with their bluff sides to the north,—in the eastern portion of the district the hills are not so high, and as compared with those of the west are as the waves of a slight swell at sea are to the billows of the raging tempest.'

"I am still of the opinion given in my report of the 28th June 1856, published in same compilation, that the Thurr desert has no affinity with the alluvial plains of Sind—(of course in addressing a geographic Society I refer only to the term in its geographic and statistical meaning; but it may not be out of place for me to notice that since the recent outbreak, the Thurr has, I am informed, been placed under political management instead of the Hydrabad Collectorate)—and that it constitutes rather a part of Rajpootana than of Sind, though on the northern

side it partially merges into that country. The shape and direction of the sand hills point to the action of the S.W. monsoons that may have been going on for ages ere their surface became sufficiently glued together by the debris of vegetable and animal matter to offer consistency enough to retain their shape, and permit of bushes and even trees succeeding to the first growth, thus the highest are nearest the sea, where the full force of the wind is most felt. Northward and westward all the land that could be reached by the inundations would necessarily have its sand surface carried away and its nature changed. Southward the sea accounts for the level of the Runn.

"Believe me, faithfully yours,

"G. LeGrand Jacob."

After which the Secretary read the paper of the evening, duly to appear in the Society's Transactions.

The thanks of the Society having been voted to Colonel LeGrand Jacob and to the other donors to the Society, the meeting adjourned.

SESSION 1860-61.

Annual Meeting.—*May 16th*, 1861.

Present.—A. H. Leith, Esq., M.D., *Vice-President* in the Chair; The Honorable W. E. Frere, C.S., *Vice-President*.

Members.—Sir Jamsetjee Jeejeebhoy, Bart.; Jugonnath Sunkersett, Esq.; Revd. W. K. Fletcher, M.A.; Dr. G. C. M. Birdwood; Dr. Bhawoo Dajee; Venayekrao Jugonnath Esq.; Captain James Frushard, I.N.; John Ritchie, Esq.; C. D. Leggatt, Esq.; J. E. C. Pryce, Esq.; Narayen Dinanathjee, Esq.; Rao Saheb Wishvanath Narayen Mandilk; and D. J. Kennelly, Esq., *Secretary*.

Visitor.—Captain T. Black, P. & O. Service.

Elected.—Dr. H. D. Glasse.

Donations.—The following donations were laid on the table, for which the best thanks of the Society were directed to be given to the donors:—

1. Journal of the Royal Geographical Society of London, Volume XXX. By the Society.

2. Selections from the Records of the Bombay Government, No. LX., Captain Fife's Report on the Eastern Narra being appended. By Government.
3. Statements exhibiting the External Trade of Sind for the year 1859-60. By Mr. W. Maher, Deputy Collector of Customs, Kurrachee. By Government.
4. Aperçus Historique de la Boussole et ses Application à l'Etude des Phénomènes du Magnétisme Terrèstre, lue à Société de Géographie dans la Séance Publique du 29 Avril 1860. Par M. D'Avezac, President de la Commission Centrale. By the Author.
5. A Lunar Tidal Wave in the North American Lakes. By Lieut. Colonel J. D. Graham.
6. Meteorological Register kept at Coconada, during the months of December 1860, January, February, and March 1861.
7. Meteorological Register kept at Cuddalore, during the months of December 1860, January, February, and March 1861.
8. Thermometer Register for the months of January, February, and March 1861, kept at Pahlunpore. By the Government.

Letters read.—From N. Shaw, Esq., Secretary, Royal Geographical Society of London, and W. W. Smith, Esq., Secretary, Geological Society of London, acknowledging with thanks the receipt of the Volume XV. of the Bombay Geographical Society's Transactions.

2. From Colonel W. Scott, Secretary to Government, forwarding a copy of the selections from the records of the Bombay Government, No. LX.

3. From Captain H. D. Brown, Amoy, in reply to a letter from the Secretary on the subject of Cyclones in the China Seas, in which he states his readiness to supply the Society with Notes on the same from time to time as he may have opportunity, and the following from Lieut. G. T. Robinson, H.M.I.N., to the Secretary:—

"H.M.S. *Berenice*, I.N., Kurrachee, April 24th, 1861.

"My dear Sir,—I wish through the Society to call attention to a portion of the China Sea contained within a circuit of 22 miles from Pulo Sapata. Referring to 7th Edition of Horsburgh's Directory, I find (page 339) Rawson Shoal alluded to as *said* to be situated 20′ E.S.E. of Pulo Sapata, and that it has only 14 feet water on it; another, Hopkin's Bank, is said to be *still* doubtful in its position. Tusan and Julia shoals are not alluded to. I have conversed with several men whose avocation lead them this road in charge of valuable lives and property,

On examining the Voting Lists, the following were declared the Office-Bearers for the following year :—

Vice-Presidents.

The Honorable W. E. Frere, C.S.
Captain W. C. Barker, I.N.
A. H. Leith, Esq., M.D.

Resident Members.

G. C. M. Birdwood, Esq., M.D.
Bhawoo Dajee, Esq., G.G.M.C.
R. S. Sinclair, Esq., LL.D.
Robert Haines, Esq., M.D.
Rev. J. E. Carlile.
W. F. Hunter, Esq.
F. D. Faithfull, Esq.
Sir Jamsetjee Jejeebhoy, Bart.
Colonel G. H. Robertson, C.B., and A.D.C. to the Queen.
Narayen Dinanathjee, Esq.
Captain James Frushard, I.N.
Lieut. P. M. Mitcheson, I.N.

Non-Resident Members.

Sir H. B. E. Frere, K.C.B.
Brigadier General LeGrand Jacob, C.B.
Commander G. C. Constable, I.N.
Major A. B. Kemball, C.B.
Dr. F. Broughton, F.R.C.S.
Captain J. F. Jones, I.N.
Lieutenant W. M. Pengelley, I.N.
Rev. J. Murray Mitchell, LL.D.

The thanks of the Society having been voted to the President and Office-Bearers, and also to the Secretary for what had been effected during the Session, Mr. John Ritchie said, that as it was probable he might not again, for some time, have the opportunity of addressing the Society in person, he would beg permission to use the present occasion of pressing upon the Society's attention a question of great importance as bearing vitally upon the interests of Navigation and Commerce in the China Seas.

Permission having been given from the Chair, Mr. Ritchie said.—"On a recent voyage to China I had more than once occasion to notice the very imperfect and incomplete Surveys and Charts of the China Seas. I have now before me the latest Admiralty Chart corrected up to last year, and without attempting to point out its many deficiencies I would, in illustration of what I state, direct your attention to the shoals lying round Pulo Sapata in the parallels of 9° and 11° North Latitude and 109° and 111° East Longitude. As you are aware, Pulo Sapata is one of the great leading marks for vessels trading between China, England, and India, both on the outward and homeward voyage; the commerce that flows past it cannot be reckoned at less than 100 millions sterling annually, the steam vessels of the Company which I represent alone carrying at least twenty-five millions: yet round this island I find the following shoals laid down, some of them doubtful, and the position and extent of all of them undetermined:—

"'Julia,' three fathoms.
"'Christopher Rawson,' 14 feet. Ship lost.
"'Raglan.'
"'Toosun.'
"'Hopkin's Bank.'
"'Fort.'
"'Alexander.' Ship lost.
"'Columbia.'

"Such a state of things, to say the least, is not creditable; and as it lies within the sphere of the Society's duties, I trust its influence will be used with Government here and in England to have the blot removed from the Chart of these seas. It can be done without difficulty and at small expense. One steamer could do the whole work in a fortnight, and there is now a fleet of Gun Boats lying at Hong Kong unemployed, and there are three Surveying Vessels stationed in the Straits.

"There are other parts of the China Seas requiring re-survey, but it may be advisable for the Society to confine its application to this special case, as otherwise the magnitude and expense of the work might be made an excuse for delay."

Mr. Kennelly said, that it had been a chief aim of the Society during the last two years to attract attention to the dangerous practice much in vogue by the use of unauthorised Charts by Masters of Ships navi-

gating the Indian and China Seas. He stated that this had not altogether been without effect. Admiralty Charts of these seas are now sent out by the Hydrographer to the Admiralty, and sold at the office of the Conservator of the Port at very moderate rates, an arrangement which he believed was in a measure effected through the efforts of our President. This has been a very effective step for the introduction of authorized Charts, and it will now be the further duty of the Society to take such action as shall tend to the production of Charts which shall be in all respects what are required for the efficient navigation of the Eastern Seas.

The Honorable Mr. Frere: As this is a subject which demands our immediate attention, perhaps Mr. Ritchie will be good enough to forward to our Secretary a Paper embodying what he has stated to us. The Society would then be in a position to address Government on the subject, with the hope of obtaining a remedy.

Mr. Ritchie said that he would be glad to do so: after which the meeting adjourned.

SESSION 1861-62.

FIRST MEETING.—*September 19th*, 1861.

Present.—Captain James Frushard, I.N., in the Chair.

Members.—R. S. Sinclair, Esq., LL.D.; Dr. G. C. M. Birdwood; Dr. Bhawoo Dajee; Dr. H. D. Glasse; Dr. Atmaram Pandoorung; Lieutenant P. W. Mitcheson, I.N.; J. E. C. Pryce, Esq.; Rao Saheb Wishvanath Narayan Mundlik; and D. J. Kennelly, Esq., *Secretary*.

Elections.—E. Harrington, Esq., and Rev. Duncan Macpherson.

Hermann de Schlagintweit, Esq., was unanimously elected an honorary member of the Society.

Members Proposed.—T. Black, Esq., proposed by John Ritchie, Esq., and seconded by the Secretary; C. Daly, Esq., C.S., proposed by the Secretary, and seconded by Dr. G. C. M. Birdwood; and Lieut. H. Burn, I.N., proposed by the Secretary, and seconded by J. E. C. Pryce, Esq.

Donations.—Several donations were laid on the table, for which the best thanks of the Society were directed to be given to the donors.

Letters Read.—Of several letters there were the following:—

From Captain Barton, Swatow, in reply to a letter from the Secretary, enclosing extracts from logs kept there during the heavy typhoons of 1858-59, and stating his readiness to keep the Society informed regarding cyclones, meteors, &c., as might come within the compass of his knowledge.

2. From A. K. Forbes, Esq., Secretary to Government, forwarding a copy of a letter from Captain R. L. Playfair, Aden, relative to the eruption of a Volcano near Edd, on the African shore of the Red Sea:—

No. 2264 OF 1861.

POLITICAL DEPARTMENT.

SIR,—I am directed by His Excellency the Governor in Council to forward to you, for the information of the Geographical Society, the accompanying copy of a letter from the Assistant Political Resident in charge of the Aden Residency, No. $\frac{233}{90}$, dated the 27th ultimo, relative to the eruption of a Volcano near Edd, on the African shore of the Red Sea, about half way between Mussowah and the Straits of Bab-el-Mandeb.

I have the honour to be, &c.

(Signed) A. KINLOCH FORBES,
Acting Secretary to Government.

Bombay Castle, 20th June 1861.

No. $\frac{233}{90}$ OF 1861.

POLITICAL DEPARTMENT.

From Captain R. L. PLAYFAIR,
Assistant Political Resident, in charge of Residency, Aden.

To A. KINLOCH FORBES, Esq.
Acting Secretary to Government, Bombay,

SIR,—A very remarkable phenomenon has occurred in this vicinity, the eruption of a Volcano near Edd,* on the African shore of the Red Sea, about half way between Mussowah and the Straits of Bab-el Mandeb.

* Lat. 13° 57′ N., Long. 41° 40′ E.

2. A native of that village states as follows:—"On the night of the 7th, or morning of the 8th instant, the people of Edd were awakened by the shock of an earthquake, followed by others which continued with little intermission for about an hour. At sunrise a quantity of fine white dust fell over the village like rain; about noon the character of the dust appeared to change, and then resembled red earth; shortly afterwards it increased to such an extent that the air was perfectly darkened and we had to light lamps in our houses. It was darker than the darkest night, and the whole place was covered with this dust nearly knee deep.

"On the 9th the dust somewhat abated, and we were able to see a little in our houses without lights; at night we saw fire and dense smoke issuing from a mountain named Jebel Dubbeh, situated about a day's journey inland, and this continued all the time I remained at Edd; the ashes only fell for two days; sounds like the firing of guns issued from the mountain. This mountain is inhabited, but no one had reached Edd thence when I left; nothing of the kind had ever been heard of before, and the people are exceedingly frightened."

3. This account has been amply confirmed from other sources, and the most remarkable feature of the case is the immense extent affected by the disturbance.

4. The officer commanding the detachment at Perim heard the sounds emitted by the volcano distinctly, and attributed them to a bombardment; he reported—"The firing commenced about 2 A.M. on the 8th instant, and continued, with long intervals, up to the 10th or 11th; the general idea at Perim was that the sound proceeded from the African coast; the firing on the 8th was very heavy, and continued for 9 or 10 hours."

5. Both the Steamers *Candia* and *Ottawa* reported having had two very hot days in the lower part of the Red Sea, and on the 10th instant they encountered what appeared to be like a London fog, which continued for several hours; the Captain of the latter vessel described this fog as consisting of very fine dust, so thick that he could not see the length of the ship, and during its continuance the weather was perfectly calm.

6. On the 8th instant several shocks of an earthquake were felt at Mokha and Hodaida, and there, as well as along the entire coast of Yemen, and inland as far as the mountain range, the dust described as "white ashes" fell for several days. The noises were also heard, and as usual were attributed to artillery.

8. The Nacoda of the boat which brought Mr. Barron's letter was detained ten days in the Dhalac Archipelago, unable to continue his voyage owing to the dense clouds of dust which darkened the air. Many other Nacodas reported the same thing, and one brought me a specimen of this dust, which I forward in a separate parcel. He said it fell in such quantities that he could not keep his poop clear by continual sweeping.

9. The dust appears like very finely-powdered pumice, containing minute particles of mica.

10. Although the greater part of the shores of the Red Sea are undoubtedly of igneous orgin, no active volcano has been known in modern times save in the Zebair Islands, one of which was observed in a state of activity by the Commander of the I. N. Steamer *Victoria* in (I think) August 1846.

I have the honour to be, &c.,

(Signed) R. L. PLAYFAIR,

Assist. Political Resident, in Charge.

Aden, 27th May 1861.

3. From A. K. Forbes, Esq., Secretary to Government, forwarding copies of letters from Surgeon Major A H. Leith, Surgeon H. J. Carter, and Dr. Robert Haines, with regard to their opinions on the analysed dust emitted from the Volcano near Edd:—

No. 2381 of 1861.

POLITICAL DEPARTMENT.

SIR,—In continuation of the letter from this Department, No. 2264, dated the 20th ultimo, I am directed to forward to you, for the information of the Geographical Society, copies of Reports by the Gentlemen named in the margin, containing their opinions regarding the dust emitted from the Volcano in the neighbourhood of Edd, specimens of which were sent to them for analysis.

From Surgeon H. J. Carter, dated the 22nd June 1861.
„ Surgeon Major A. H. Leith, European General Hospital, dated the 24th June 1861.
„ Dr. R. Haines, Acting Chemical Analyser to Government, dated the 26th June 1861.

I have the honour to be, &c.

(Signed) A. KINLOCH FORBES.

Acting Secretary to Government.

Bombay Castle, 2nd July 1860.

From HENRY JOHN CARTER, F.R.S., Surgeon,
To A. KINLOCH FORBES, Esq., C.S.,
Acting Secretary to Government.

SIR,—I have the honour to acknowledge the receipt of your letter No. 2261, dated the 21st instant, and accompaniment respecting the eruption of a Volcano on the 7th or 8th ultimo, near Edd on the African shore of the Red Sea, about half way between Mussowah and the Straits of Bab-el-Mandeb, with specimen of the "dust" therefrom collected by a Nacoda from the poop of his vessel in the Dhalac Archipelago.

In reply thereto I have the honour to state for the information of His Excellency the Governor in Council, that in accordance with His Excellency's request I have examined this "dust," and find it to consist of nothing but minute irregularly-shaped fragments of volcanic glass charged with air-bubbles, in fact, "Pumice."

This appears to be a common product of volcanoes, and probably the nearer it is followed to its source the larger the grains will become, until it will be found about the volcano in the form of what is termed "Pisolitic Peperino," mixed with more or less fragments of other volcanic matter in a bed of considerable thickness, such as exists at Aden, and affords the material for the cement now used for the "Harbour Defences," such as that covering Pompeii, and indeed such as that forming part of our own Trappean (volcanic) area in the island of Salsette at Santa Cruz, a little beyond Wanda on the main road, where mill-stones are made from it, though here it has become so consolidated that none but an experienced eye could detect it.

The specimen of "dust" is herewith returned.

I have the honour to be, &c.,
(Signed) H. J. CARTER, Surgeon.

Bombay, 22nd June 1861.

From Dr. LEITH, Surgeon Major,
To A. KINLOCH FORBES, Esq.,
Secretary to Government.

SIR,—I have the honour to acknowledge the receipt of your letter No. 2262, with accompanying copy of letter No. $\frac{233}{70}$ from Aden, and a packet containing a specimen of the dust that darkened the air at the time of the volcanic eruption that occurred in the neighbourhood of Edd.

2. In compliance with the request conveyed to me in your letter, I have examined the contents of the packet, and found it to consist chiefly of microscopic grey vitreous grains that were seen to be vesicular and fibrous, and that fused before the blowpipe into a blackish glass, thus showing the characters of the common *grey volcanic ashes*. These grains were mixed with equally fine blackish angular fragments of obsidian, and more sparingly with minute particles of iron, and somewhat larger angular grains of felspar. The dust was, by chemical means, ascertained to contain also a small quantity of argillaceous matter, probably finely-powdered clay.

3. From the examination it appears that the matter which in this case fell from the air was similar to what is frequently discharged during volcanic eruptions, and is borne by the wind to distances even greater than those mentioned in Captain Playfair's letter.

I have the honour to be, &c.,
(Signed) A. H. LEITH, Surgeon Major,
Surgeon European General Hospital.

Bombay, 24th June 1861.

No. 15 OF 1861.

POLITICAL DEPARTMENT.

From the ACTING CHEMICAL ANALYSER to Government,
To A. KINLOCH FORBES, Esq.,
Acting Secretary to Government.

SIR,—In acknowledging the receipt of your letter No. 2263, dated the 20th instant, with its enclosures and accompanying packet of volcanic dust, I have the honour to state that chemical and microscopic examination of the latter tends to establish the correctness of the presumption as to its origin. It is a homogeneous compound of a glassy nature, fusing with difficulty to a black frothy slag; it presents under the microscope no trace of organization, but exhibits a mass of small semi-transparent non-crystalline fragments, some colourless, others brown and red. It is, in fact, as described by Captain Playfair, "powdered pumice."

I have the honour to be, &c.,
(Signed) R. HAINES, M. B.,
Acting Chemical Analyser to Government.

Bombay, 26th June 1861.

4. From A. K. Forbes, Esq., Secretary to Government, forwarding copies of the correspondence from Lieutenant-Colonel C. P. Rigby, British Consul and Agent at Zanzibar, regarding the murder of Dr. Albrecht Roscher, at the village of Kisoongoone, in Central Africa :—

No. 2189 OF 1861.

POLITICAL DEPARTMENT.

SIR,—I have the honour by direction of the Honorable the Governor in Council to forward for the information of the Geographical Society, copy of the correspondence noted in the margin, from Lieutenant Colonel C. P. Rigby, Her Majesty's Consul and British Agent at Zanzibar, relative to the murder of Dr. Albrecht Roscher, at the village of Kisoongoonee in Central Africa.

1 Dated July, 15th No. 43 of 1860, with accompaniment.
2 ,, September 14th, No. 50.
3 ,, August 28th, No. 45 para. 7.
4 ,, November 16th, No. 75.
5 ,, April 17th, No. 16 of 1861.

I have the honour to be, &c.,
A. KINLOCH FORBES,
Acting Secretary to Government.

Bombay Castle, 10*th June* 1861.

No. 43 OF 1860.

POLITICAL DEPARTMENT.

From Lieutenant Colonel C. P. RIGBY,
Her Majesty's Consul and British Agent, Zanzibar.
To H. L. ANDERSON, Esq.,
Secretary to Government, Bombay,

SIR,—I have the honour to report for the information of the Right Honorable the Governor in Council, that Dr. Albrecht Roscher, a gentleman who was sent by His Majesty the King of Bavaria, on a scientific mission to east Africa, was murdered on the 19th of March last, at the village of "Kisoongoonee," three days' journey to the north-east of the great Lake of Nyassa.

2. Dr. Roscher arrived at Zanzibar in the month of September 1858, and was the bearer of a letter from Her Majesty's Principal Secretary of State for Foreign Affairs to my address, instructing me to render all possible assistance to him in furtherance of the objects of his journey.

3. After remaining some time at Zanzibar, he visited the opposite mainland, and travelled alone on foot to the river Lufiji, which had never previously been visited by any white man, and after exploring its course for a considerable distance he returned to Zanzibar, where he was detained sometime by severe attacks of fever.

4. He again left Zanzibar, in June 1859 to explore the great Lake of Nyassa, and having joined a caravan at Keelwa, started from that Port on the 24th of August last, and reached the Lake on the 19th of November, being the first white man who has ever reached its shores. He was in very bad health when he left Zanzibar, and became so weak on the journey that he was carried on a cot all the latter part of it. He remained at "Nussewa" on the borders of the lake nearly four months. On the 16th of March last he left Nussewa to go to the river "Rovooma," which is crossed about twelve days' journey from lake Nyassa on the road to Keelwa; he evidently intended to return to the lake from the Rovooma, as he left nearly all his baggage in charge of the Sultan of Nussewa, and was only accompanied by two negro servants, and two porters for his luggage, viz. one man and one woman.

5. The surviving servant states that on the third day they arrived at the village of "Kisoongoonee," about midday, and Dr. Roscher was invited by the head man of the village to his house. About 4 o'clock P.M. Dr. Roscher was sleeping in this house, and one servant was lying at the door, the other servant had gone to a stream some distance from the village to bring water. On his return he heard the other servant, who was his own brother, calling to him to come quick as the villagers were about to attack them. On reaching the village he saw a number of men armed with bows and arrows in front of the house, and at the same moment his brother was shot. Dr. Roscher just then appeared at the door of the house and was instantly shot with two arrows, one striking him in the breast, the other in the throat. He fell and expired almost immediately. The surviving servant then approached the bodies, the murderers being intent on plundering the house. Seeing that his master and brother were dead, he ran away, but was wounded in the hand by an arrow. He concealed himself in a field until dark, when he returned to the village, and the next morning went back to Nyassa and reported the murder of his master to the chief, Sultan Makawa.

6. This chief at once gave him an escort to accompany him to the abode of the chief, by name Sultan Kingomanga, in whose territory the

murder was committed, and who resides four days' journey from the lake. Sultan Kingomanga sent five of his men with the servant to point out the village and ascertain if the inhabitants had fled. On arriving at the village the servant pointed out the owner of the house in which Dr. Roscher was resting, and who was the man who fired the two arrows; a revolver belonging to Dr. Roscher was found in his possession. Fearing that the small party would be attacked if they took him prisoner, they returned to the abode of Sultan Kingomanga, who then went to the village himself with fifty of his followers; after some show of resistance the villagers submitted, and surrendered four men who they stated were those chiefly concerned in the murders. Of these one is the head man of the village, who shot Dr. Roscher, another is the brother-in-law of this man, who the servant swears was one of the most prominent in the attack, and in whose possession articles belonging to Dr. Roscher were found when he was seized. The other two the servant does not recognise.

7. These four prisoners arrived here with the surviving servant two days ago, and are in the Fort awaiting their trial by His Highness the Sultan. I fear that Dr. Roscher's journal, drawings, &c. are lost, as he had them with him when killed, and they have not been recovered. All the instruments, books, and other articles which he left with Sultan Makawa, Chief of Nussewa, have been forwarded to Keelwa by him, and the Sultan Kingomanga has also sent the articles recovered at the village where the murders were committed. I have sent my Arabic Moonshee to Keelwa, and the property will probably arrive here in a few days.

8. There appears to be no doubt that Dr. Roscher was murdered solely for the sake of plunder; travelling in such a country without any escort or guard, and with articles sure to excite the cupidity of savages, was extreme rashness. The people on the lake appear to have always treated him with the greatest kindness, and I think that the very friendly conduct of the two chiefs, Sultan Makawa, and Sultan Kingomanga, shows, that with ordinary precautions, travellers in the country of the Nyassa have nothing to fear.

9. When Dr. Roscher was very weak and unable to walk, Sultan Kingomanga caused him to be carried on a cot, and himself escorted him to Lake Nyassa. The Sultan Makawa showed equal kindness. When an attack on his village was expected, he invited Dr. Roscher to take up his abode in his own house for greater security, and on hearing

of his death forwarded to the coast all the property left in his charge. These chiefs had never before seen a white man, and Dr. Roscher was alone, and without the means of making them any recompense. I think that Sultan Kingomanga showed a noble feeling in going to seize the murderers at risk to himself; and I therefore respectfully suggest, that as Dr. Roscher was travelling under British protection, it would show that the kindness of these chiefs towards the first white man who ever visited their country is appreciated, if Sultans Makawa and Kingomanga were each presented by Government with some small acknowledgment. A few pieces of bright coloured cottons or chintz, or a piece of broad cloth, would be most suitable.

10. I have detailed at some length all the circumstances of this unfortunate occurrence, because the melancholy death of Dr. Roscher will be much regretted in Germany, great expectations having been justly formed from his scientific acquirements, and his devotion to the cause of African Exploration.

11. I herewith annex the deposition of the surviving servant, as taken by me on his return here, as it contains many circumstances connected with the journey of his late master, and also with the hitherto unknown Lake of Nyassa.

I have the honour to be, &c.,
(Signed) C. P. Rigby, Lieut.-Colonel,
H. M's. Consul and British Agent, Zanzibar.

British Consulate, Zanzibar, 15th July, 1860.

Deposition of Rashid, a free African servant in the employ of the late Dr. Albrecht Roscher, as deposed before me, this thirteenth day of July 1860, *at Her Majesty's Consulate, Zanzibar.*

My name is Rashid. I belong to the Makona Tribe. I have always been a free man. I came to Zanzibar from Mozambique about twelve years ago. I was a servant at the French Consulate for two years. I took service with the late Dr. Roscher at Kutwa, my pay was fixed at five dollars a month. When Dr. Roscher left Keelwa for the interior, he took with him two servants, viz., myself and my brother, whose name was Omar. He was killed with Dr. Roscher, but I could not recognise the person who killed him. Dr. Roscher travelled from Keelwa to the Lake of Nyassa; he was about three months on the road. He travelled in company with an Arab by name Salim bin Abdullah. On arriving at Lake Nyassa my master took up his abode

in the house of a native of the country by name "Maroola." The name of the town is "Nussewa." It is a large populous place, stretching far along the shore of the lake. The lake is of very great length, but not very broad. From Nussewa the opposite shore was just visible on a clear day. The lake abounds in fish of various kinds, some are as long as my arm. My master was not in good health when he reached the lake. He remained at Nussewa three months and twenty-five days. The name of the Chief of Nussewa is Sultan Makawa, he governs a great extent of country. He was very friendly always to my master, and on his arrival received him with great honour. During our stay at Nussewa, a wandering people called the "Mafiti" came to attack it, and Sultan Makawa then begged my master to come and dwell with him for security, and sent porters to carry his luggage. My master took no soldiers with him from Keelwa; he had nineteen porters and two servants. All the porters returned from Nussewa with Salim bin Abdullah. The only persons who remained at Nussewa after the return of Salim bin Abdullah were my master, myself, and the servant who was afterwards killed. The inhabitants of Nussewa were always very friendly, and used to bring my master new milk every morning. On the journey from Keelwa my master hurried on before the caravan, and arrived at Nussewa three or four days before Salim bin Abdullah. A chief of the Mujan tribe, by name Sultan Kingomanga, escorted my master to Nussewa, as he was ill and obliged to be carried on a cot. This is the same chief who afterwards seized the murderers. He resides at the village of "Mamemba," about 3½ days' journey from the great lake. My master left half his store of goods with Salim bin Abdullah near the river Rovooma, and he promised to send them on, but did not do so, and therefore my master was afterwards very angry and complained of Salim bin Abdullah's conduct. I never saw the latter ill-treat my master or take any of his property on the road. My master never suffered from want of food whilst at Nussewa, he always had plenty of rice and milk, and occasionally meat. He also procured fowls, and fish was always abundant. Myself and the other servant always had plenty of food, and my master always gave us fresh fish. The lake is often very rough with waves like the ocean. Great storms sometimes occur. Whilst at Nussewa we heard that a boat with white men * and a number of black followers had

* This doubtless refers to Dr. Livingstone's visit to the Lake Shirwa, called "Kirwa" in this deposition. (Signed) C. P. R.

arrived at a river near the south end of the Nyassa, and that they had returned in consequence of their provisions being expended. The lake "Kirwa" is to the south of the Nyassa, there is no communication between the two lakes; the water of the Nyassa is very sweet, that of Lake Kirwa is brackish; the people from Nussewa travel to it to procure salt.

On the 23rd day of the month of Shaban (17th March), my master left Nussewa with the intention of going to the river Rovooma to bring back some goods he had left in charge of a chief, by name Sultan "Likoomboo," who lives on its banks; he had left these goods there on his journey up from Keelwa. We left Nussewa in the morning, the party consisted of my master, myself, the servant who was killed, and two porters, of the latter one was a woman. The Sultan sent two of his men as an escort, who returned on reaching the boundary of their master's dominions. My master was in good health at this time, and travelled on foot. We passed the first two nights in villages on the road, and on the third day arrived at the village of "Kisoongoonee" soon after midday. We halted in the village, and my master was sitting under a tree, the villagers came around, and the head man, whose name is "Mokokota," invited my master to take up his abode in his house, and he did so. I and the other servant then prepared food, and after partaking of it my master lay down to rest. Myself and the other servant reclined in front of the door. I had observed the owner of the house running off towards another village, and I soon after observed four men creeping on all fours towards the house. I immediately went in and aroused my master, and told him that when these men approached a house in this manner, it was a sign that they intended mischief. My master told me it was nothing, and not to fear, but go and bring water from a stream some distance from the village. On my return I heard the other servant, my brother Omar, calling out to me to come quick as they were attacked. On arriving near the village I saw a crowd of natives headed by the owner of the house in which my master was resting; I then saw the servant Omar fall, shot with an arrow. Just after that the owner of the house advanced towards the door, and my master appeared at the door of the house and was immediately shot in the breast with an arrow by the owner of the house, whose name is "Mokokota," and who is now a prisoner in Zanzibar Fort. Another arrow fired by the same man struck him in the throat, and he fell just at the door and soon expired. I was at this time only a few yards off, and on seeing my maste

fall I went up to him, he uttered three groans and then expired. The people were then busy plundering the house, and on observing me, an arrow was fired which wounded me in the finger, upon this I ran away and hid in a field of Cassawa. After dark seeing that the people had all left, I returned to the house, both bodies were lying as they had fallen, my master's body had not been stripped. No person was near the bodies. About midnight some people came up, I hid myself near, and saw them lift up both bodies and carry them away. In the morning I returned to the lake and reported the murder of my master to the chief. As the village in which the murder took place was not in his dominions, he sent some men with me to Sultan Kingomanga at Mamemba, he sent five men with me to the village; on arriving there we found the owner of the house in which my master was murdered, he was seized and a revolver belonging to my master was found on him. This man was the chief of his village, and therefore we were afraid to detain him until we got more aid and so released him. Seeing so many people we were afraid of being attacked, and therefore returned to Sultan Kingomanga at Mamemba; the Sultan then went himself with fifty men to the village where the murders occurred; on our arrival the people came out to attack, but seeing the Sultan, were afraid and surrendered; a council was then held and the villagers delivered up four men as the murderers. Two of them were residents in the village, their names are "Sikamboni" and "Mokokota." I don't think the other two took any part in the murders, as they do not belong to that village.

The Sultan took the four men as prisoners to his own village and then forwarded them to the Rovooma; the supplies which had been sent from Keelwa for my master came to Sultan Kingomanga's village. After halting two or three days, I returned with the prisoners and the party in charge of the supplies to Keelwa. I have also brought down all the property Dr. Roscher had left at Nussewa on the lake. He left printed books only there, his "Dufter" or journal, and all his own writings and drawings were taken away after his murder and are lost.

Deposed before me this 13th day of July 1860.

(Signed) C. P. RIGBY, Lieut.-Colonel,
H. M's. Consul and British Agent, Zanzibar.

British Consulate, Zanzibar, 13th July 1860.

No. 50 OF 1860.

POLITICAL DEPARTMENT.

From Lieutenant Colonel C. P. RIGBY,
H. M.'s Consul and British Agent, Zanzibar.

To H. L. ANDERSON, Esq.
Secretary to Government, Bombay,

SIR,—With reference to my letter to your address, No. 43 of 1860, Political Department, dated 15th July, reporting the murder of Dr. Albrecht Roscher, and suggesting that some small present should be bestowed on the Sultan Makawa, Chief of Nusscwa on the great Lake of Nyassa, who treated Dr. Roscher with unvarying kindness and hospitality during the period of four months that he resided in his dominions, and also on the Sultan Kingomanga, a powerful chief of the Jhayou tribe, who siezed the murderers of Dr. Roscher and forwarded them here together with all his property; I have the honour to report for the information of the Right Honorable the Governor in Council that an officer of the Hanoverian army—Colonel the Baron Van der Decken—having recently arrived here with the intention of making a scientific exploration in Central Africa, and being about to leave for the Lake of Nyassa in a few days, I have delivered to him letters in Arabic addressed to the above two chiefs, expressing the thanks of the British Government for their hospitable and friendly treatment of the first white man who ever visited their dominions, and have also forwarded to each a scarlet robe and six yards of scarlet broadcloth; the sum I have paid for these articles amounts to (42½) forty-two and a half German crowns, for both chiefs, and I therefore respecfully solicit the sanction of His Lordship in Council for the disbursement of the above sum.

2. The Baron Van der Decken having been furnished with a letter from Her Majesty's Principal Secretary of State for Foreign Affairs, desiring me to afford him all possible aid and protection, I considered that these letters and presents may be of material assistance to him, and also that so safe an opportunity of forwarding them may not again occur for a long time, and I have therefore done so in anticipation of Government sanction.

I have the honour to be, &c.
(Signed) C. P. RIGBY, Lieut.-Colonel,
H. M.'s Consul and British Agent, Zanzibar.

British Consulate, Zanzibar, 14th September 1860.

Extract paragraph 7 from a letter from Her Majesty's Consul and British Agent, Zanzibar, dated 28th August, No. 45 of 1860.

Paragraph 7. The two murderers of Dr. Albrecht Roscher were beheaded on the 23rd instant, and shortly before their death they confessed their guilt in the presence of Captain Grant of the East African Expedition. Very great endeavours were made by many of the Arabs to induce His Highness the Sultan to withhold his consent to the execution of these men; it was publicly said that it is against the Arab law to take the life of any man for murdering an infidel, and that when a French Naval Officer was some years ago murdered on the coast, the late Imaum simply confined the murderer in the Fort. I made very strong remonstrances to His Highness and was obliged to be very persistent before the order for their execution was given. I think that the just punishment of these men will have a very good effect, in showing these bigoted Arabs that no European, of whatever nation, can be murdered with impunity in these countries.

No. 75 OF 1860.

POLITICAL DEPARTMENT.

From Lieutenant Colonel C. P. RIGBY,
H. M.'s Consul and British Agent, Zanzibar.

To H. L. ANDERSON, Esq.,
Chief Secretary to Government, Bombay.

SIR,—I have the honour to acknowledge the receipt of your letter No. 3428 of 1860 (Political Department), dated 8th September 1860, relative to the murder of the late Dr. Albrecht Roscher in Central Africa on the 19th of March last.

2. In my letter to your address, No. 45 of 1860 (Secret Department), dated the 28th of August last, I reported that the execution of the two murderers of Dr. Roscher had taken place here on the 23rd of that month.

3. In my letter to your address, No. 50 of 1863 (Political Department), dated 14th September, I reported having forwarded presents of scarlet cloth and scarlet jackets to the two chiefs, by name Sultan Makawa and Sultan Kingomanga, who treated Dr. Roscher with such great kindness and hospitality. The bearer of the presents, Colonel the Baron Van der Decken, of the Hanoverian army, left this some time ago, and it is his intention to make every effort to recover Dr. Roscher's journal, drawings, &c. which were lost at the time of his murder.

4. All the other effects of Dr. Roscher have been taken charge of by the Consul of the Hanseatic Republics at this port and forwarded to his family in Germany.

I have the honour to be, &c.
(Signed) C. P. RIGBY, Lieut.-Colonel,
H. M.'s Consul and British Agent, Zanzibar.

British Consulate, Zanzibar, 16th November 1860.

No. 16 OF 1861.

POLITICAL DEPARTMENT.

From Lieutenant Colonel C. P. RIGBY,
H. M.'s Consul and British Agent, Zanzibar.
To H. L. ANDERSON, Esq.,
Chief Secretary to Government, Bombay.

SIR,—With reference to my letter to your address, No. 50 of 1860 (Political Department), dated 14th September 1860, reporting my having sent a present of a scarlet robe and six yards of scarlet cloth to each of the two Chiefs on the Lake of Nyassa, in acknowledgment of their friendly and hospitable treament of the late Dr. Albrecht Roscher, I have the honour to report for the information of His Excellency the Honorable the Governor in Council that the attempt of Colonel the Baron Van der Decken—who kindly took charge of the presents—to reach the Lake of Nyssa, has proved unsuccessful, and he has returned here, and delivered back the presents to me.

2. I am therefore waiting for the first safe opportunity to forward the presents to the two Chiefs.

3. The Baron Van der Decken had arrived within fifteen days' journey of the Lake of Nyassa, and had found the inhabitants everywhere friendly, when his head guide, a native of Keelwa, by name Abdallah bin Saeed, suddenly announced his determination to proceed no further, and as all the porters with the Baron were the slaves of this man, he ordered them also not to remain with the Baron, who was in consequence obliged to return to Keelwa, with the loss of nearly all his baggage, which was plundered by the guide and his slaves.

4. The river "Rovooma," which falls into the sea in about 10° 25' South latitude, is now being explored by Dr. Livingstone in the

new steamer *Pioneer*, recently constructed for the use of his expedition. Dr. Livingstone is accompanied by Bishop Mackenzie and some of the members of the Oxford and Cambridge Mission to Central Africa. It is Dr. Livingstone's intention, after proceeding up the river in the steamer as far as is practicable, to endeavour to reach the Lake of Nyassa by land. He is taking up presents for the two Chiefs who treated Dr. Roscher so kindly.

5. Commander Oldfield, R.N., commanding Her Majesty's Ship *Lyra*, accompanied the *Pioneer* about forty miles up the river "Rovooma." He states that the inhabitants are very friendly, and the country through which the river flows extremely rich and populous.

I have the honour to be, &c.

(Signed) C. P. RIGBY, Lieut.-Colonel,

H. M's. Consul and British Agent, Zanzibar.

British Consulate, Zanzibar, 17th April 1861.

5. From the Secretary, Imperial Geographical Society of Russia, transmitting his grateful thanks for the honor done him by being elected an honorary member of the Society. He adds that the Imperial Geographical Society of Russia is much delighted to enter into a direct communication with this Society, and concludes with an assurance, that, so far as he is personally concerned with it, he will not fail, as much as possible, to strengthen the links between both the Societies.

6. From H. and R. Schlagintweit, Esquires, forwarding a copy of the Theoretical Considerations and Tables in reference to Indian Hypsometry, and requesting to know if the Journal of this Society would allow a space for embodying their theoretical Considerations with respect to India.

7. From A. E. Ford, Esq., Kattywar, forwarding a bottle log picked up at Maungrole, Kattywar coast, at daybreak, 24th May 1861.—*The Secretary.* The log was thrown from the *Berenice* on the 27th April 1861, while on her way from Kurrachee to Aden; it was picked up 28 days after at Maungrole, Kattywar coast, having drifted 401 miles S., 83 E., or 14·4 miles per day.

8. From the Deputy Commissioner, Bassein, Pegu, forwarding a bottle log picked up in latitude 17° 25′ N., and longitude 94°

12' E.—*The Secretary*. This log was thrown from the *Berenice* on the 21st December 1860, when nearly on the parallel of Madras in the Bay of Bengal, and was picked up on the Burmese coast, inside the St. John's Rocks, having taken a course across the Bay in a direction N. 64° E. 656 miles, and picked up after an interval of 183 days.

9. From the Resident of Banda Neira, forwarding a bottle log picked up at noon on the north side of the island of Ay (one of the Isles Bandanaix).—*The Secretary*. We find this log to have been thrown from the *Berenice* off Pualo Aar, situated in the China Sea, on the 19th December, and picked up on the north side of the Island of Ay, one of the Banda Isles, on the 6th of March 1861, having floated about 1,800 miles in 87 days, or, approximately, at the rate of nearly 21 miles per day. This log affords a curious instance of the manner in which a bottle log may be drifted from one sea to another while intermediately encountering, throughout its passage, obstructions almost innumerable in the shape of reefs and islands. It is probable that this log, leaving the China Sea, passed through the Straits of Gaspar, or the Billiton Passage, into the Java Sea, through which it took its way across the mouth of the Strait of Macassar, winding through the Archipelago into the Flores Sea, and, finally, depositing itself on the shore of one of the Banda Isles far east, and well towards the approaches to the Arafura Sea.

SESSION 1861-62.

SECOND MEETING.—*October 17th*, 1861.

The ordinary monthly meeting of the Bombay Geographical Society was held in their Rooms, Town Hall, on Thursday, the 17th October, at half-past 4 P.M.

Present.—Lieut. E. F. T. Fergusson, I.N., F.R.A.S., in the Chair.

Members—J. E. C. Pryce, Esq.; Dr. Atmaram Pandoorang; Lieut. J. G. Nixon, I.N.; Dr. G. C. M. Birdwood, M.D.; Jugonnath Sunkersett, Esq.; Rev. W. K. Fletcher, M.A.; Captain James Frushard, I.N.; and D. J. Kennelly, Esq., *Secretary*.

Donation.—The following donation was laid before the Society for which the best thanks of the Society were directed to be given to the donor :—

1. Deaths in Bombay during 1860. By the Principal Inspector General Medical Department.

Letters Read.—From Hermann de Schlagentweit, Esq., Bavaria, thanking the Bombay Geographical Society for his being elected an honorary member of the Society, and promising an early despatch of a memoir on the hypometrical features of India and High Asia.

3. From Captain Stockwell, having reference to a proposed exploration of Eastern Africa.

4. From J. D. Inverarity, Esq., Commissioner in Sind, forwarding original documents from the Collector of Shikarpoor and Political Superintendent Upper Sind Frontier, being reports on the rise, progress, and results of the late flood or overflow of the Indus which endangered the towns of Shikarpoor and Jacobabad. These papers appeared to be worthy of preservation, and were, therefore, ordered to be inserted in the Society's publications.

The thanks of the Society having been voted to Mr. Inverarity for his valuable communication, the meeting was adjourned to the 16th January 1862.

SESSION 1861-62.

FIFTH MEETING.—*January 16th*, 1862.

The ordinary monthly meeting of the Bombay Geographical Society, was held in their Rooms, Town Hall, on Thursday, the 16th January at half-past 4 P.M.

Present.—Captain W. C. Barker, I.N., *Vice-President*, in the Chair.

Members.—Narayan Dinanathjee, Esq.; Rao Saheb Vishvanath Narayan Mandlik, Dr. G. Birdwood, M.D.; Dr. Atmaram Pandoorung; Lieut. G. T. Robinson, I.N.; Munguldass Nuthoobhoy, Esq.; J. E. C. Pryce, Esq.; Munmohundass Davidass, Esq.; General G. Le-Grand Jacob, C.B.; and D. J. Kennelly Esq., *Secretary*.

Member Proposed.—Lieut W. L. Searle, I.N., proposed by the Secretary and seconded by Lieut. G. T. Robinson, I.N.

Donations.—The following donations were laid before the Society, for which the best thanks of the Society were directed to be given to the donors:—

1. Abstracts of the Papers printed in the Philosophical Transactions of the Royal Society of London, from 1800 to 1854. Vols. I., II., III., IV., VI. By the Royal Society, London.
2. Proceedings of the Royal Society, No. 43, Vol. XI. By the Royal Society.
3. The Journal of the Bombay Branch of the Royal Asiatic Society, No. 21, Vol. VI. By the Society.
4. Report of the Bombay Chamber of Commerce for the year 1860-61. By the Chamber of Commerce.
5. Magnetical and Meteorological Observations made at the Government Observatory, Bombay, in the year 1860. By Government.
6. A Catalogue Raisonné of rare, valuable, and curious books sold. By Bernard Quaritch.

Letters Read.—From Lieut. E. F. T. Fergusson, I.N., Superintendent, Government Observatory, forwarding a copy of the Magnetical and Meteorological Observations made in the year 1860.

From Lieut. W. M. Pengelley, I.N., British Agent at Muscat, forwarding a bottle log of H.M.S. *Elphinstone*, picked up, some day between the 8th August and the 6th September last, on the Mekran Coast at Rabbage, near the village of Mundauny. The Secretary explained that this log had traversed a distance of 235 miles in an almost due northerly direction, but that very little value must be attached to the result, owing to the want of correct data.

General Jacob having favoured the Society with some remarks on the remarkable surface formation of the Thurr district, the Secretary intimated to the Society the urgency of their nominating a member to act jointly with himself as Secretary. He had felt his duties of late very heavy, and that he could no longer unaided, carry on the work of the Society as he would wish. He hoped the Society would select Dr. Birdwood to assist him. The Secretary alluded to the precedent of Drs. Buist and Heddle. The Vice-President trusted Dr. Birdwood would consent.

Dr. Birdwood stated, that Mr. Kennelly had already spoken to him on the subject. His own duties were so heavy that he would have refused the request, but for the circumstances under which it had been made. Mr. Kennelly had performed the duties of his office in such a

Quiloa the coast is steeper, and the land may be some one hundred feet above the water. From time to time, lines of hills are visible, at an apparent distance of from thirty to forty miles inland.

"Captain Oldfield tells me he cannot find the point entered in the chart as the Kawnitz Breakers, and that the position of the Lazau's Bank is erroneously entered."

Mr. Kennelly then submitted the catalogue prepared by him of the Library of the Bombay Geographical Society, combined with an index to the Society's papers and illustrations contained in the first fifteen volumes of their Transactions. A vote of cordial thanks having been unanimously passed to Mr. Kennelly for his exertions in carrying out the Society's wishes, General G. LeGrand Jacob, C.B., read his paper, "Extracts from a journal kept during a tour made in 1851 through Kutch, giving some account of the alum mines of Murrh and of changes effected in 1844 by a series of earthquakes that appear hitherto to have escaped notice." After a long discussion, in which many of the members present took part, and the best thanks of the meeting having been voted to General Jacob for his most valuable and interesting paper, the meeting adjourned to Thursday, March 20th, 1862.

SESSION 1861-62.

SEVENTH MEETING.—*March 20th*, 1862.

The ordinary monthly meeting of the Bombay Geographical Society was held in their Rooms, Town Hall, on Thursday, the 20th March at half-past 4 P.M.

Present.—Commodore G. G. Wellesley, C.B., R.N., *President*, in the Chair.

Members.—Lieut. W. L. Searle, I.N., F.R.A.S.; Clement D. Leggatt, Esq.; Munguldas Nuthoobhoy, Esq.; Edwin Heycock, Esq.; the Honorable Jugonnath Sunkersett; Framjee Nusserwanjee, Esq.; Sir Jamsetjee Jejeebhoy, Bart.; General G. LeGrand Jacob, C.B.; Rao Sahib Vishvanath Narayan Mandlik; Captain James Frushard, I.N.; Lieut. E. F. T. Fergusson, I.N., F.R.A.S.; Captain Mohommed Bin Hamees; the Rev. W. K. Fletcher, M.A.; and D. J. Kennelly, Esq., I.N., and George Birdwood, Esq., M.D., *Joint Secretaries*.

The minutes of the last meeting were read and confirmed.

Member Proposed.—Commander W. B. Selby, I.N., proposed by D. J. Kennelly, Esq., I.N., and seconded by George Birdwood, Esq., M.D., *Joint Secretaries.*

Donations.—The following donations were laid before the Society, for which their best thanks were directed to be given to the donors:—

1. Report on Vaccination throughout the Bombay Presidency and Sind for the year 1860. By the Principal Inspector General Medical Department.
2. Bulletin de la Société de Géographie Cinquième Serie, Tome II. By the Geographical Society of Paris.

After the perusal of several letters, which concluded the business of the meeting, Mr. Heycock read his paper, "The Mosaic account of the passage of the Israelites out of Egypt, supported by the geographical configuration of the country surrounding the Gulf of Suez."

After a very animated discussion upon the leading features of the arguments brought forward by Mr. Heycock in support of his subject, an unanimous vote of thanks was passed to him for his highly valuable and interesting paper. The meeting was adjourned to the 17th April.

SESSION 1861-62.

EIGHTH MEETING.—*17th April*, 1862.

The ordinary monthly meeting of the Bombay Geographical Society was held in their Rooms, Town Hall, on Thursday, the 17th April at half-past 4 P.M.

Present.—Commodore G. G. Wellesley, C.B., R.N., *President*, in the Chair.

Members.—Captain W. C. Barker, I.N.; Dr. F. Broughton, F.R.C.S.; J. E. C. Pryce, Esq.; Captain James Frushard, I.N.; General G. LeGrand Jacob, C.B.; Lieut. W. L. Searle, I.N., F.R.A.S.; the Hon'ble Mr. W. E. Frere, C.S., F.R.G.S., F.R.A.S.; Lieut. G. T. Robinson, I.N.; the Honorable Mr. Jugonnath Sunkersett; Munguldass Nuthoobhoy, Esq.; Venayekrao Jugonnath, Esq.; and D. J. Kennelly, Esq., I.N., and George Birdwood, Esq., M.D., *Joint Secretaries.*

The minutes of the last meeting were read and confirmed.

Elections.—Commander W. B. Selby, I.N.; Captain J. T. Annesley, being a member of the Bombay Branch Royal Asiatic Society was admitted under Rule XXII. of the Society.

Member proposed.—Commander H. A. Fraser, I.N., proposed by Capt. James Frushard, I.N., and seconded by D. J. Kennelly, Esq., I.N., *Secretary.*

Donations.—Several donations were laid before the Society, for which their best thanks were directed to be given to the donors.

Letters Read.—From A. H. Leith, Esq., M.D., V.P.

2. From Dhanjibhai Framjee, Esq.
3. From Lieut. E. F. T. Fergusson, I.N., F.R.A.S.
4. From Captain J. M. J. Stockwell, H. M.'s 95th Regiment Foot.

The following letters were also read:—

"To the Secretary of the Geographical Society of Bombay.

"Sir,—Your letter requesting information and papers for the use of a proposed expedition into Eastern Africa, has been referred by the Council of the Royal Geographical Society to a Committee consisting of myself and others. We were desired to confer with Lieut.-Col. Rigby, H.B.M., Consul at Zanzibar, now temporarily resident in England, and then to communicate with you. By desire of that Committee I send you our conclusions.

"I regret we have no MS. maps of value for your purposes.—I have the honour to be, &c.,

"(Signed) FRANCIS GALTON,

"Honorary Secretary, Royal Geographical Society."

"In reference to the inquiries made by the Bombay Geographical Society, it should be observed that the extent of coasts whence, future explorations of importance may be directed into Eastern Africa, has become considerably limited by expeditions now in progress or recently completed.

"Beginning at the south, we may look on the Nyassa as entirely in the hands of Livingstone; and other Zambezi travellers, such as Count Thurnheim. Livingstone, as we know, has established early access to the southern end of the Lake, and has announced his intention of exploring the whole of it at the earliest opportunity. It would be a waste of resources to direct new travellers to that same district.

" Proceeding northward, the itineraries of native traders supply enough information for the present rude wants of African geography of the country between Quiloa and the Nyassa; and we have received slight, but definite, knowledge of the same through Roscher's ill-fated exploration, followed up, as it has been to some degree, by the Baron von der Decken.

" Taking yet another step, we arrive at the track of Barton and Speke, who have certainly left nothing of primary importance undescribed.

" The fourth and last section of known country is to the eastward of Mombas whence Baron von der Decken has lately travelled to Klimanjiaro, and where he still proposes to travel.

" Thus there is no urgent call for a new expedition that should leave the coast of Africa between the Zambezi and Mombas; but Eastern Africa is almost untouched between the Mombas and the Red Sea. The field that here awaits exploration is too vast to be exhausted by any single expedition. Three distinct undertakings may be specified.

" *The first* is to ascend the Juba, the Ozi, and other rivers as far as they are navigable. They have all been visited by slaves, and opposition might be experienced on entering them, partly from that cause, and partly owing to hostilities between the Somauli and the Massai; but no serious obstruction need be apprehended by a well-equipped party, large enough to command respect.

" *The second* and the most difficult would be a land exploration through the Somauli. Their language is an obstacle to travellers from the side of Zanzibar where interpreters cannot be engaged, while the religious political fanaticism of their northern tribes is an equal bar to travellers from Aden, where a suitable expeditionary party might perhaps be collected. The most promising course would be to land at Mogadoxo, and to reside there for some months, learning the language and acquiring a hold of the good will of the people before attempting further progress.

" Additional interest is given to this exploration by the fact that Lieut.-Colonel Rigby, H.B.M. Consul at Zanzibar, is firmly persuaded that some Englishmen are now in captivity among the Somaulis, for a report to that effect has been confirmed by different witnesses. He believes them to be part of the crew or passengers of an East Indiaman, supposed to have been wrecked near the Mauritius in 1855, but whose cargo or rather a number of miscellaneous effects, resembling those known to have been carried by her, are come into the possession of the Somaulis.

"An exploring party would find in their report an intelligible pretext for their presence in the land, and a stimulating object for their earlier movements.

"The last course would be to adopt Mombas as the head quarter, and thence to pass into the interior by a route to the northward of that travelled by the Baron von der Decken. The country behind Mombas is a less unhealthy residence than other parts of the coast, and an expeditionary party might be organized there at leisure, with help from Zanzibar. The Rev. Mr. Krapf resides in its neighbourhood, the natives are accustomed to Europeans, and the traders mostly speak Hindoostani. It would be impossible at the present time to plan an exploration in Africa that would afford hope of more interesting discovery than one leading from Mombas round the northern flank of Kenia, and thence onwards towards Gondakoro.

"(Signed) FRANCIS GALTON,
"Honorary Secretary Royal Geographical Society."

"To the Secretary to the Bombay Geographical Society,
"Bombay, 25th March 1862.

"DEAR SIR,—I regret much that I was not present at the last meeting of the 'Society' when that very interesting paper, 'The Mosaic account of the passage of the Israelites out of Egypt,' &c. &c., by Mr. E. Heycock, was read, the more so, as my name, I perceive by the report of the 'proceedings' published in the *Times of India* of the 25th instant, was several times introduced. I regret not being present also, from the fact of having frequently wandered about the localities alluded to by Mr. Heycock, and should have liked to have taken part in the discussion. The only remedy left me is to try and make amends for my absence on the occasion referred to.

"In looking over my papers I chanced to alight upon some notes made during one of my wanderings, and notwithstanding upwards of 13 years have elapsed, it may not prove altogether uninteresting, and may be looked upon somewhat in the light of a sequel to Mr. Heycock's paper. Should the Society be of this opinion, I may be induced to look further through my papers, as my wanderings at various times extended to Humum El Pharoun, about 55 miles from Suez along the western shore of the peninsula of Mount Sinai, and to 'Tor,' which I take to be the Elim of the Scriptures, about 65 miles further south.

"To return, however, to Mr. Heycock's paper, I would call attention to the fact (as noticed in my paper herewith forwarded) that what is termed Wady Mousa in Moresby's chart of the Red Sea, was known only to Arabs I met with in that locality by the name of 'Wady Towareek,' signifying the 'little' or 'contracted' pass in allusion to the entrance to the valley being very narrow. The tribe in the immediate vicinity is also called Towarah.

"As the hosts of the Egyptians—while in pursuit of the Israelites—emerged from the narrow pass, which is formed by the mountains in the rear of Aboo Deraj on the south, and those in the rear of Jibble Ataka on the north, and beheld the children of Israel encamping before Pihahiroth between Migdol and the sea over against 'Baal' Zephon, well might Pharaoh exclaim, 'Behold they are entangled in the land, the wilderness hath shut them in.'

"The mountain of Aboo Deraj (Deraj signifying ladder) so called from forming, as it were, a series of steps one behind the other, rises very abruptly from the sea to the height of about 3,000 feet. I made the highest part of Jibble Ataka about 2,500 feet, but this must be considered only as an approximation, as I had not the proper instruments with me for determining its height accurately.

"'And when Pharaoh drew nigh, the children of Israel lifted up their eyes, and, behold the Egyptians marched after them and they were sore afraid, and the children of Israel cried unto the Lord.'

"And well might they be sore afraid: the only possible outlet or apparent means of escape was in possession of their enemies, who had so cruelly oppressed them 'four hundred and thirty years,' from whose ruthless hands the Great Jehovah alone could deliver them (and he did deliver them), 'with a mighty hand and outstretched arm.' Too late was the cry of the Egyptians, 'Let us flee from the face of Israel; for the Lord fighteth for them against the Egyptians' for 'the waters returned and covered the chariots and the horsemen and all the host of Pharoah that came into the sea after them; there remained not so much as one of them.'

"I know not what authority Mr. Heycock has for supposing the children of Israel, after they had been miraculously delivered, that 'they were led in a north-easterly way towards the promised land.' I have been told by several Arabs that at a short distance before coming to Humum El Pharour, there are several wells of bitter water called 'Mareh' or 'Moneh.'

"And they came to Elim, where were twelve wells of water and threescore and ten palm trees. This is the modern 'Tor.' The water here is good and abundant, and it is the first place that palm-trees are met with after leaving Ayoun Mousa, or Moses' Wells.

"'Tor' forms a small but snug harbour during the prevalence of northerly winds. The wells are close to the beach; it is a place of call for all coasting craft bound up or down the sea of Suez. It is anything but a safe anchorage during southerly winds; these are very rare, but when they do set in, they generally blow with great violence for from 15 to 18 hours, and as the water at the surface is forced onwards by the violence of the wind, it causes the sea to attain a higher level than ordinary, by some 2 or 3 feet (in the more contracted parts) by which means the reefs become covered, and thus all protection from the force of the angry sea, as it dashes against the shore, is removed: so that what might be considered, with a north wind, a safe and commodious haven, becomes during a southerly gale, a place of shipwreck and disaster.

"Having by this time doubtless completely exhausted your patience, I will now conclude by forwarding the accompanying paper if you think it of sufficient interest to lay before the Society; and if so, and if there is no other paper for the next meeting, I shall be glad to attend and read it.—Believe me, dear Sir, yours faithfully.

"(Signed) W. C. BARKER."

Captain Barker having been called upon, read the following paper:—

"Brief account of a visit to Moses' Wells ('Ayoun Mousa'), near Suez. Ruins of the Monastery of Saint Paul's highland of Aboo Deraj, and Wady Towareek (the Wady Mousa of Moresby)."

Commander Fraser's paper, "Memoranda and extracts from various sources relative to the capabilities of the River 'Juba' in East Africa for navigation; and the resources of the countries adjoining it," was then discussed, and the Joint Secretaries were directed to refer it to the Bombay Chamber of Commerce.

The best thanks of the Society having been unanimously voted to Captain Barker and Commander Fraser for their highly valuable and interesting papers, the meeting adjourned to Thursday, 15th May 1862.

SESSION 1861-62.

ANNUAL MEETING.—*May 15th*, 1862.

The Annual General Meeting of the Bombay Geographical Society was held in their Rooms, Town Hall, on Thursday, the 15th May, at half-past 4 P.M.

Present.—Captain W. C. Barker, I.N., *Vice-President*, in the Chair.

Members.—Surgeon F. Broughton, F.R.C.S.; Captain James Frushard, I.N.; Rao Saheb Vishvanath Narayan Mandlik; Bhawoo Dajee, Esq., G.G.M.C.; Captain Mohammed Bin Hamees; Lieut. W. L. Searle, I.N., F.R.A.S.; Robert Haines, Esq., M.D.; and D. J. Kennelly Esq., I.N., and George Birdwood, Esq., M.D., *Joint Secretaries*.

The minutes of the last meeting were read and confirmed.

Elections.—Commander H. A. Fraser, I.N., and A. Faulkner, Esq.

Donations.—The following donations were laid before the Society, for which their best thanks were directed to be given to the donors:—

1. Proceedings of the Royal Society of London, Vol. XI. No. 44. By the Society.
2. Journal Asiatique ou Recueil de Mémoires, &c., Cinquième Series, Tome XVIII. By the Asiatic Society of Paris.
3. Mémoire sur le Commencement et la Fin du Royaume de la Mesene et de la Kharacene. Par M. Reinaud.

Letters read.—From Captain J. T. Annesley.

2. From T. F. Punnett, Esq.

3. From C. P. Wilson, Esq., Mate H. M.'s Steamer *Elphinstone*, forwarding copies of a series of bottle logs thrown overboard from that vessel by him.

4. From Dr. Norton Shaw, Secretary Royal Geographical Society of London, forwarding a list of route maps selected from the Society's journals in aid of the contemplated expedition under Captain J. W. J. Stockwell.

5. From M. J. Shaw Stewart, Esq., Acting Secretary to Government, forwarding a copy of a letter from Lieut. Colonel Lewis Pelly, Her Majesty's Acting Consul and British Agent at Zanzibar, containing miscellaneous observations on the Comoro Islands.

The business of the monthly meeting being concluded, that of the annual meeting was taken up, when the Secretaries, in accordance with the usual custom, laid before the Society a brief account of the proceedings of the Session.

At the last annual meeting the Society's members numbered 102. Since then there had been removed by death—1, Colonel G. H. Robertson, C.B.; by retirement from India—5, General G. LeGrand Jacob, C.B.; Surgeon Major C. Morehead, M.D.; Surgeon Major J. W. Winchester, LL.D., F.R.C.S.; H. Conybeare, Esq.; and Henry Young, Esq., C.S.; and by resignation of memberships—2, Major C. W. Walker and T. F. Punnett, Esq., in all 8 members; while on the other hand 14 members had been admitted, making the total number of the Society's members 108, or 6 members in excess of last year.

Colonel G. H. Robertson, C.B., was a much esteemed member of our body. He had belonged to, and very materially aided in forwarding the aims of the Society while it was yet in its infancy, withdrawing from it for a time previous to the year 1860, when he again was admitted a member. The sixth volume of our Transactions contains a a paper contributed by him, giving a narrative of a journey from Kilat to Sonmeanee *viâ* Nal, the Baran Luk, and Ootal. This distinguished soldier died at Aden on the 10th of January last, universally regretted.

General G. LeGrand Jacob, C.B., who took his departure from India but very lately, was the senior member of the Society, having been admitted in the year 1834. Possessing a quick and ever active perception, and aided by a facile pen, he proved himself by his many contributions to our Transactions to be one of the most valued and most indefatigable of our members. The papers contributed by him are—

1. Brief Historical, Geographical, and Statistical Memoir on Okhamundul.

2. Report upon the general condition, at that date, of the Province Kattywar, and containing various points of imformation, principally of a geographical and statistical nature, connected with that interesting province.

3. Extract from a Report on the District of Babriawar, dated the 15th March 1843.

4. Notice of Borneo, the Eastern Archipelago; a Lecture delivered before the Bombay Geographical Society, September 20th, 1855.

5. Extract from Journal of a Trip to Sind from Kutch in 1852.

6. Extracts from a Journal kept during a tour made in 1851 through Kutch, giving some account of the alum mines of Murrh and of changes effected in 1844 by a series of earthquakes that appear hitherto to have escaped notice.

Surgeon Major J. W. Winchester, LL.D., F.R.C.S., was admitted a member in the year 1839. One of the earliest papers appearing in our Transactions was contributed by him, namely, a memoir on the River Euphrates, &c., during the late expedition of the H. C. armed steamer *Euphrates*. He also further contributed, " Note on the Island of Karrack, in the Gulf of Persia."

" Note on the practicability of advancing an army from Europe into Asia by the Provinces of the Euphrates and Tigris." " Some Notes on Sind."

Surgeon Major C. Morehead, M.D., was admitted to the Society in in the year 1838, and was therefore at his departure one of our oldest members. During the long period of his membership he ever displayed a readiness to forward the views of the Society by every means in his power.

Henry Young, Esq., C.S., entered the Society in the year 1850, and as Secretary to the local Government took every opportunity, in addition to personal co-operation, of advancing the interests of our body.

The members who have been admitted during the past year are E. Harrington, Esq. ; the Rev. Duncan Macpherson ; Lieut. H. Burn, I.N. ; C. Daly, Esq., C.S. ; Thomas Black, Esq. ; Lieut. G. T. Holt, I. N. ; the Rev. R. F. Colvin ; the Rev. R. Galbraith ; Lieut. W. L. Searle, I.N., F.R.A.S. ; Framjee Nusserwanjee, Esq. ; Commander W. B. Selby, I.N. ; Captain J. T. Annesley ; and Commander H. A. Fraser, I.N.

It is recorded with pleasure that the interest of the Session has been sustained by an uninterrupted contribution of valuable papers from members and others. The following have been read before the Society at its different ordinary meetings of the Session :—

1. Remarks on a portion of the Eastern Coast of Arabia between Muscat and Sohar, by Lieut. P. M. Pengelley, I.N., British Agent at Muscat. Presented by Government and read before the Society at their second meeting, October 17th, 1861.

2. Memoir on Bahreyn, by Lieut. R. W. Whish, I.N. Presented by the author, and read before the Society at their third meeting, Nov. 21st, 1861.

3. Report on the rise, progress, and results of the late flood or overflow of the Indus, which endangered the towns of Shikarpoor and

Jacobabad. Presented by J. D. Inverarity, Esq., C.S., Commissioner in Sind, and read before the Society at their fourth meeting, December 19th, 1861.

4. Extracts from a Journal kept during a tour made in 1851 through Kutch, giving some account of the alum mines of Murrh, and of changes effected in 1844 by a series of earthquakes that appear hitherto to have escaped notice, by General G. LeGrand Jacob, C.B. Presented by the author, and read before the Society at their sixth meeting, February 20th, 1862.

5. On the Mountains forming the Eastern side of the Basin of the Nile, and the origin of the designation "Mountains of the Moon," by Dr. C. T. Beke. Presented by the author.

6. The Mosaic Account of the passage of the Israelites out of Egypt, supported by the geographical configuration of the country surrounding the Gulf of Suez, by Edwin Heycock, Esq. Presented by the author, and read before the Society at their seventh meeting, March 20th, 1862.

7. Brief account of a visit to Moses' Wells ("Ayoun Mousa"), near Suez. Ruins of the Monastery of Saint Paul's highland of Aboo Deraj, and the Wady Towareek (the Wady Mousa of Moresby), by Captain W. C. Barker, I.N., Vice-President. Presented by the author and read before the Society at their eighth meeting, April 17th, 1862.

8. Memoranda and Extracts from various sources, relative to the capabilities of the River "Juba" in East Africa, for navigation; and the resources of the countries adjoining it, by Commander H. A. Fraser, I.N., communicated through the President.

Within the last few days two other papers have been received, one from Dr. J. Lalor, entitled "Rough notes showing outline of the country between Kurrachee and Gwadel," and the second "Miscellaneous observations upon the Comoro Islands," from the Government.

A catalogue to the Society's library and papers has been published, and is now in the hands of members.

A new book-case has been placed in the Society's rooms, and particular attention has been given to the library, many of the volumes of which have been rebound; a large sum having been appropriated for this object.

Opportunity will be taken of the approaching recess for preparing the 16th volume of the Society's Transactions.

A catalogue to the Society's maps, charts, &c. is in course of preparation.

The accounts of the year are balanced and await audit.

The voting lists having been examined, the following gentlemen were declared the office-bearers for the ensuing year, 1862-63:—

Vice-Presidents.

1. Barker, Captain W. C., I.N.
2. Frere, The Honorable W. E., C.S., F.R.G.S., F.R.A.S.
3. Mansfield, Lieut.-Gen. Sir W. R., K.C.B.

Resident Members.

1. Bhawoo Dajee, Esq., G.G.M.C.
2. Black, Thomas, Esquire.
3. Fergusson, Lieut. E. F. T., I.N., F.R.A.S.
4. Fletcher, The Rev. W. K., M.A.
5. Frushard, Captain James, I.N.
6. Haines, Robert, Esquire, M.D.
7. Hebbert, H., Esq., C.S.
8. Jejeebhoy, Sir Jamsetjee, Bart.
9. Pengelley, Lieut. W. M., I.N.
10. Robinson, Lieut. G. T., I.N,
11. Sinclair, R. S., Esq., LL.D.
12. Vaughan, Surgeon J., F.R.C.S.

Non-Resident Members.

1. Constable, Commander C. G., I.N.
2. Glasse, Surgeon Major H. D.
3. Jones, Captain J. F., I.N.
4. Kemball, Lieut. Col. A. B., C.B.
5. Leith, Surgeon Major A. H., M.D.
6. Mitchell, The Rev. J. M., LL.D.
7. Mitcheson, Lieut. P. W., I.N.
8. Sylvester, Dr. G. H., F.G.S.

It was then moved by Captain Barker, Vice-President in the Chair, and seconded by Captain Frushard, that the report submitted by the Secretaries be adopted, and that a vote of the Society's best thanks be passed to the President and Secretaries, and also to the office-bearers of the past year.

It was then proposed by Mr. Kennelly, seconded by Captain Barker, V.P., and unanimously carried, that His Excellency the Honorable Sir Henry Bartle Edward Frere, K.C.B., be invited to become the Patron of the Society. After which the meeting adjourned.

SESSION 1862-63.

FIRST MEETING.—*September 18th*, 1862.

Present.—The Honorable W. E. Frere, C.S., F.R.G.S., F.R.A.S., *President*, in the Chair; Captain W. C. Barker, I.N., *Vice-President.*

Members.—The Rev. W. K. Fletcher, M.A.; R. Haines, Esq., M.D.; C. D. Leggatt, Esq.; Lieut. G. T. Robinson, I.N.; J. E. C. Pryce, Esq.; Rao Saheb Wishvanath Narayen Mandlik; Surgeon J. Vaughan, F.R.G.S., F.R.C.S.; Capt. J. T. Annesley; the Rev. J. M. Mitchell, LL.D.; the Rev. R. F. Colvin; G. C. M. Birdwood, Esq. M.D., and D. J. Kennelly, Esq., I.N. *Joint Secretaries.*

The minutes of the last meeting were read and confirmed.

Members proposed.—The Honorable M. H. Scott; E. P. Repton, Esq.; W. T. Stevens, Esq.; Colonel H. J. Barr; C. Forjett, Esq.; Dr. James Welsh; W. Campbell, Esq., M.D.; and J. Burgess, Esq.. F.E.I.S.

Donations.—The following donations were laid before the Society, for which their best thanks were directed to be given to the donors:—

1. Narrative of a second voyage in search of a North-West Passage, &c., by Sir J. Ross, C.B., &c. By R. Haines, Esq. M.D.
2. Appendix to Captain Parry's journal of a second voyage in search of a North-West Passage from the Atlantic to the Pacific. By R. Haines, Esq., M.D.
3. Kohl's Russia. By R. Haines, Esq., M.D.
4. Grosier's General Description of China, 2 vols. By R. Haines, Esq., M.D.
5. Transactions of the Bombay Medical and Physical Society for the year 1861. By the Society.
6. A glance at Dr. Martin Haug's Essays on the Sacred Language, Writings, and Religion of the Parsees, by E. Rehatsek, Esq. By the Author.
7. Annual Report of the Bombay Grant Medical College for the Session 1861-62. By Surgeon J. Peet, M.D., Principal.
8. Report of the Students' Literary and Scientific Society, and of the Vernacular Branch Societies and Girls' Schools, for the Session 1861-62. By the Society.
9. Report of the Bombay Benevolent Library for 1861. By the Managing Committee.

10. Report on Vaccination throughout the Bombay Presidency and Sind for the year 1861.—By the Principal Inspector General Medical Department.
11. Report on the Ganges Canal Works, by Colonel Sir P. T. Cautley, K.C.B., F.R.S., 3 vols. with Plans.—By Government.
12. Proceedings of the Royal Geographical Society of London, Vol. VI. No. 2.—By the Society.
13. Journal of the Royal Asiatic Society of Great Britain and Ireland, Vol. XIX. Part IV.—By the Society.
14. General Hypsometrical Tableau of India and High-Asia, by Hermann Adolphe and Robert de Schlagintweit, Esqrs.—By the Authors.
15. Bulletin of the American Geographical and Statistical Society for 1856; Report of the State Engineer and Surveyor of the Canals of the State of New York for 1854; Report of the Governors of the Alms House, New York, for 1855; Report of the Canal Commissioners of the State of New York; Report of the Commissioners of Emigration for New York; Report of the Secretary of State on the Criminal Statistics of New York; Report of the Secretary of State relative to the Statistics of the Poor; Statistics and Geography of the Production of Iron, by A. S. Hewitt, Esq.; Access to an open Polar Sea, by Dr. E. K. Kane, M.D.; Discourse on the Growth of Cities, by H. P. Tappan, Esq. D.D., LL.D.; and Report of the Chamber of Commerce.—By the American Geographical and Statistical Society.
16. Smithsonian Contributions to Knowledge, Vols. IX. XI. XII.; Reports of the Board of Regents of the Smithsonian Institution, Washington, for 1856, 1857, 1858, 1859; Report of the Secretary of War upon the Lake Harbour Improvements for 1857; Defence of Dr. Gould, by the Scientific Council of Dudley Observatory; Reply to the Statement of the Trustees of the Dudley Observatory, by B. A. Gould, Jr.; Motions of Fluids and Solids relative to the Earth's Surface, by W. Ferrel, Esq. A.M. —By the Smithsonian Institution.
17. Reports of the United States Coast Survey for the years 1856 and 1857.—By Professor A. D. Bache, Superintendent.
18. Tables of the Coins, Weights, and Measures in use in British India and the United Kingdom.—By J. Burgess, Esq., F.E.I.S
19. On the Tides.—By J. Burgess, Esq., F.E.I.S.

20. Maps: the World in Hemispheres; S.W. Germany; Egypt, Nubia, Abyssinia, Arabia Petræa; United States of N. America, Western States; Belgium; the Netherlands; Persia and Afghanistan; China and Japan; N. America; United States, E. States; India, Southern sheet; Ireland; N.W. Africa; S. Africa; Turkey in Asia; S. America; England; India, N. sheet; Spain and Portugal; Palestine; South America; Asia; and Africa.—By A. K. Johnston, Esq., F.R.S.E., G.F.G., &c.

Letters read.—From Lieutenant R. G. Watson, Her Majesty's Embassy at the Court of Persia.

2. Lieutenant G. L. Lewis, I.N.

3. His Excellency Lieutenant-General Sir W. R. Mansfield, K.C.B.

4. T. Black, Esq.

5. Lieutenant G. T. Robinson, I.N.

6. Surgeon-Major J. Peet, M.D.

7. Edward Rehatsek, Esq.

8. The Secretary Bombay Mechanics' Institution.

9. The Secretary American Geographical and Statistical Society, New York.

10. The Secretary Smithsonian Institution, Washington.

11. H. Brooke, Esq., Secretary Bombay Chamber of Commerce, acknowledging Secretary's letter which accompanied Commander Fraser's pamphlet on the capabilities of the River Juba in Eastern Africa, and stating in reply that the members of the Chamber do not appear sufficiently interested in the locality in question to lend pecuniary co-operation towards its further exploration.

12. Major W. L. Merewether, Acting Secretary to Government, communicating the Resolution of Government on a letter from the Commissioner in Sind, submitting for favourable consideration a letter from Commander Balfour, bringing to notice the value of River Fluctuation Register at Kotree, and suggesting that some arrangements should be made for its continuation, &c.

The following letter from Commodore Wellesley, President of the Society, intimating his resignation of that office, was then read:—

"*London, July 29th*, 1862.

"To the SECRETARY of the Bombay Geographical Society, Bombay.

"DEAR SIR,—Having ceased to hold the command of the Indian Navy, I beg leave to resign the office of President of the Bombay Geo-

graphical Society, and to express through you to the members there of my very sincere thanks for the courtesy and support I have received on all occasions during the five years in which I have had the honour of presiding over the Society's meetings.

"Believe me, dear Sir, &c.

"(Signed) G. G. WELLESLEY, Captain, R.N."

Upon which the Vice-President in the Chair expressed his regret that Commodore Wellesley could no longer continue President of the Society, and he felt sure that he gave not only the sense of the meeting, but the common feeling of the whole Society when he expressed the extreme regret with which they heard of Commodore Wellesley's retirement. Notwithstanding the arduous public duties Commodore Wellesley had to perform, nothing could exceed the zeal and assiduous attention with which he had discharged the office of President of the Society, nor the frank impartiality and justice with which he guided our proceedings, and all members of the Society must entertain a grateful memory of his efforts to promote the interests they had at heart. The Vice-President then suggested that a letter expressing their acknowledgment of his kind services, and regret at his loss, should be forwarded to Commodore Wellesley by the next mail, signed by all present.

The remarks from the Chair having been cordially assented to, at the request of the meeting, Mr. Frere drafted the following letter, which was adopted and signed by all the members present:—

"To Commodore G. G. WELLESLEY, C.B., R.N., Late President of the Bombay Geographical Society.

"SIR,—The Society having received your letter, dated London the 29th July, resigning the office of President of this Society in consequence of your ceasing to hold the command of the Indian Navy, desire to express their high sense of the many and great services you have rendered to the Society during the time you presided over us, and their unfeigned regret at this severance of their association with you.

"Your constant attendance at the meetings of the Society, and the urbanity and impartiality with which you guided their proceedings will leave a lasting impression in the minds of all our members, while this expression of our feelings inadequately repays you for the benefits you have conferred upon them.

"The Society still entertain a lingering hope that the fortunes and exigencies of the Honorable Service to which you belong, may again lead

you to serve on these shores, and in asking you to continue an Honorary Member of the Society, they trust that, should their hopes be fulfilled, they may derive further benefit from your co-operation with them.

"We beg to add our heart-felt wish for your happiness and future success in life, and in the Honorable Service to which you belong, and have the honour to subscribe ourselves,

"Sir,

"Your most obedient, humble Servants,

(Signed) W. E. FRERE.
" W. C. BARKER.
" R. F. COLVIN.
" J. M. MITCHELL.
" J. E. C. PRYCE.
" J. T. ANNESLEY.
" G. T. ROBINSON.
" C. D. LEGGATT.
" ROBERT HAINES.
" JAMES VAUGHAN.
" GEORGE BIRDWOOD.
" W. K. FLETCHER.
" D. J. KENNELLY."

The Rev. W. K. Fletcher in moving the nomination of a successor to Commodore Wellesley, said—"I wish it had fallen to the lot of some older member of the Society to submit the proposal which I have been requested to make. I feel that it is presumptuous in one who has been able to give so little attention to the affairs of the Society as myself should come prominently forward and propose for your election a successor to the chair of President just vacated, but the gentleman whom I am to name is well known, and all will, I believe, admit highly qualified for the office. He has been 17 years a member and a constant attendant at the meetings of the Society. His presence amongst us to-day forbids my saying more on the fitness for the office than alluding to his successful study of numismatical and other subjects akin to geographical science.

"I have, gentlemen, the pleasure of proposing for your election as President of this Society, the Honorable Mr. Frere."

Dr. Robert Haines having seconded the proposition—

The Honorable Mr. Frere was unanimously declared President of the Society, and in expressing his acknowledgments for the honour, and regret that it had not fallen on an abler and better man, he stated it would be his earnest desire to promote the interests of the Society, and to endeavour by every means in his power to assist in upholding the good name it had won to itself.

The President then called upon Lieut. Robinson, who read the first paper of the evening, entitled "Short Notes on Japan." This interesting paper was listened to with marked attention throughout, and at its close, underwent considerable discussion, in which many of the members present took part.

The President, in conveying the thanks of the Society to Lieut. Robinson for his highly interesting paper said, that the remarks which had fallen from him during its perusal were of so valuable a nature that he would take the opportunity of requesting him to favour the Society by embodying them in his paper preparatory to its taking its place in their Transactions. Lieut. Robinson having expressed his readiness to meet the Society's wishes resumed his seat amidst applause.

The next paper read was a communication from the Government— "Miscellaneous Observations upon the Comoro Islands," by Major Pelly.

At the conclusion of this paper which, as mentioned above, had been communicated by Government, the President said that on first reading it, he had been forcibly struck with the similarity which at present exists in the Island of Johanna with its state as described by Sir William Jones, when he visited it nearly 80 years ago; that he had marked several passages in Sir William Jones' description, which will be found in the 4th volume of his Works as edited by Lord Teignmouth, 8vo. edition, but as he only heard the day before that the paper was to be read at this meeting, he had not time to condense and arrange the remarks he was inclined to make; he would therefore only refer to pages 272, 273, 276, 279, 281, 282, 288, 299, 301, 304, 309, 310, as showing how little Johanna appears to have altered since 1783, as little since 1830 when the speaker himself touched there on his first voyage to India.

The President then said that he would not adjourn the meeting without reiterating his grateful sense of the honour they had that day done him.

Adjourned to Thursday the 16th October 1862.

SESSION 1862-63.

SECOND MEETING.—*October 16th*, 1862.

Present.—The Honorable W. E. Frere, F.R.G.S., F.R.A.S., *President*, in the Chair; Captain W. C. Barker, I.N., *Vice-President*.

Members.—Atmaram Pandurung, Esq., G.G.M.C.; the Rev. J. M. Mitchell, LL.D.; the Rev. R. F. Colvin; Rao Saheb Wishvanath Narayan Mandlik; Commodore James Frushard, I.N.; the Rev. W. K, Fletcher, M.A.; R. T. Reid, Esq., LL.D.; Munmohundass Davidass, Esq.; Sir Jamsetjee Jejeebhoy, Bart.; the Honorable Jugonnath Sunkersett; Framjee Nusserwanjee, Esq.; G. C. M. Birdwood, Esq., M.D., and D. J. Kennelly, Esq., I.N., *Secretary*.

Elections—Sir Alexander Grant, Bart.; the Honorable M. H. Scott; Colonel H. J. Barr; J. Burgess, Esq., F.E.I.S.; E. P. Repton, Esq.; W. T. Stevens, Esq.; W. Campbell, Esq., M.D.; C. Forjett, Esq., and Dr. James Welsh.

Member proposed.—W. M. Coghlan, Esq., C.S.

Donations.—The following donations were laid before the Society, for which their best thanks were directed to be given to the donors:—

1. Hypsometrical Measurements by means of the Barometer and the Boiling Point Thermometer, by J. Burgess, Esq., F.E.I.S.—By the Author.
2. Deaths in Bombay during 1861.—By the Principal Inspector General Medical Department.

The following letters were read:—

1. From J. Burgess, Esq., F.E.I.S.
2. From J. B. Peile, Esq., Under-Secretary to Government.
3. From M. J. Shaw Stewart, Esq., Secretary to Government, forwarding by direction of His Excellency the Governor in Council, a copy of a letter from Lieut.-Colonel Lewis Pelly, H. M.'s Acting Consul at Zanzibar, relative to the East African expedition; also a general statement of what is known to Government of the progress and prospects of the expedition under Captain Speke.

The Society then proceeded to the election of a Vice-President and two Members of the General Committee, when the names of the following gentlemen having been offered by the President, prefaced by a few complimentary remarks:—

Commodore James Frushard, I.N., was elected *Vice-President* of the Society, and G. C. M. Birdwood, Esq., M.D., and Lieutenant R. W. Whish, I N., elected Members of the General Committee.

A paper by Assistant Surgeon J. Lalor, B.A., 2nd Regiment Sind Horse, termed "Rough Notes showing outline of the country between Kurrachee and Gwadel," and also a paper from Government, containing a general statement of what is known of the progress and prospects of the expedition under Captain Speke, were read. Upon their conclusion it was—

Resolved.—That the Secretary communicate the thanks of the Society to Dr. Lalor for his valuable paper, and to His Excellency the Governor in Council for his interesting contribution.

The meeting then adjourned to Thursday, November 20th, 1862.

Captain Speke.

To Shaw Stewart, Esq., &c. &c.

Sir,—Adverting to my letter No. 191 of 18th April 1862, I am glad to be able to inform Government, that the route to the interior of Africa and the Lakes is now open, and that I last night received letters from Capt. Speke, the last dated September 30th, 1861, Bagweh, latitude 3° 28′ South. Captain Speke had met with many detentions owing to the disturbed state of the country. He had also suffered from severe fever. Captain Grant was well.

At Captain Speke's request I am now sending fifty men with 40 loads of beads, and Americans, armed, to follow on his track. These men will be under a steady headman, and I am further fortunate in being able to send the party in company with a caravan of the Sultan, now about to start.

So far as I can gather, Captain Speke will be found, if caught up, at Karagaveh, on this side of Ukhangah, about 1½ months S.W. of the Victoria Lake.

Bagweh, whence he wrote, is eight days east of the Tanganyika Lake, and 1½ months S.W. from Karagaveh.

I send all the letters received from Captain Speke to your care, with a request that you will favour me by causing them to be carefully posted. Letters sent hence by other means are not certain of arrival, and I am naturally desirous that there should be no mistake about these papers.

I send also the case of birds collected by Captain Speke, which please also cause to be transmitted.

I have the honour to be, &c.,
(Signed) LEWIS PELLY, Lieut.-Colonel.
H.B.M.'s Acting Consul and Agent at Zanzibar.

P.S.—I observe from Captain Speke's letters that he regrets not having sent Captain Grant by the line on the Kilimandjaro range coming out to the northward of the Victoria Lake; and he recommends this route to the consideration of future travellers. Government will remember it was along this line I had proposed endeavouring to aid the Mission, as per my letter of January 1862.

(Signed) LEWIS PELLY.

Memo.—Up to the 5th September 1861, the latest communication received by the British Consul at Zanzibar from the East African Expedition, was a note from Captain Speke, dated the 13th December 1860. At that date the expedition was detained on the western borders of the Unyamuezi country, awaiting the arrival of parties to replace those who had deserted from fear of a famine which then prevailed over a large tract of Eastern Africa, from the sea-coast as far as the borders of Unyamuezi.

On the 8th of the present month a letter was received by Government from Lieut. Colonel Lewis Pelly, Her Majesty's Acting Consul at Zanzibar, reporting the receipt by him, on the 9th July preceding, of letters from the East African Expedition, the last dated at Bagweh, the 30th September 1861, a place situated in latitude 3° 28′ South, between the Tanganyika and Victoria Lakes.

The progress of the expedition thus far had been impeded by a variety of causes, the principal of which were the disturbed state of the country, the severity of the famine, and heavy rains on the plateau of the Unyamuezi.

Writing from Kazeh on the 24th January 1861, Captain Speke anticipated that he would be prepared to set out in a few days to explore the northern countries, and investigate the Victoria Nyanza, with the view of determining whether or not that Lake was the source of the Nile, and of following down any affluents until he arrived in Egypt. Should unforeseen obstacles arise, he intended to endeavour to cross the northern extremities of the Nyanza and reach Zanzibar.

The expedition would attempt to reach the navigable Nile, the passage to Egypt appearing from all the information which could be collected, the more easy and economical one, and the more advantageous for the future opening of the country, and this plan would only be relinquished in the event of Mr. Petherick or any other traveller arriving at Uganda by the passage of the Nile before him.

Captain Speke and his companion Captain Grant had been most hospitably received at Kazeh by Sheik Moosa Nizari (a native of Surat), a trusted friend of the former expedition. The Sheik actively assisted in procuring porters, and he generously gave the expedition the services of all his servants, and with this aid Captain Speke was enabled to advance. The Sheik would travel in company with the expedition as far as Uganda.

(True copy)

(Signed) M. J. SHAW STEWART,
Acting Secretary.

SESSION 1862-63.

THIRD MEETING.—*November 20th*, 1862.

Present.—The Honorable W. E. Frere, C.S., F.R.A.S., F.R.G.S., *President* in the Chair; Commodore James Frushard, I.N.; and Captain W. C. Barker, I.N., *Vice-Presidents.*

Members.—Captain T. Black; Lieut. G. T. Robinson, I.N.; Surgeon J. Vaughan, F.R.G.S.; the Rev. W. K. Fletcher, M.A.; Bhau Daji, Esq., G.G.M.C., Manuckjee Cursetji, Esq., F.R.G.S.; Dr. James Welsh; Venayekrao Jugonnathjee, Esq., Munmohundass Davidass, Esq.; Rao Saheb Wishvanath Narayan Mandlik; J. E. C. Pryce, Esq.; J. Burgess, Esq., and D. J. Kennelly Esq., I.N. *Secretary.*

The Minutes of the last Meeting were read and confirmed.

Election.—W. M. Coghlan, Esq., C.S.

Donations.—The following donations were laid before the Society, for which their best thanks were directed to be given to the donors:—

1. Rules of the Literary and Philosophical Society of Manchester. By the Society.
   p 12

barrassment, notwithstanding that the majority of the Cossyahs are porters by trade; delay was thus caused in taking the field, and often afterwards. Mr. Lane reports that it frequently proved of assistance, as a turning point to the arguments employed to persuade these loyal people to act as porters, to tell them they were required "on Her Majesty's Service," interpreted "Maha Ranee ka kam." The operations were

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Mr. Shuter was employed as an Observatory Assistant and in desultory Secondary triangulation; he is reported to have been diligent and assiduous.

Mr. Rossenrode reports as follows of the tribes who inhabit Independent Tipperah: "The Court of the Rajah at Agratolla is composed entirely of Bengalees. A Bramin of Bengal has the sole management, and conducts the affairs of the state. Being a Bramin, he is also the spiritual adviser of the Rajah, who pays him the greatest reverence and respect, and remains standing during any interview which may take place between them. The Praboo, as this Bramin is called, is not very popular from having cut down the expenses of the Rajah, reduced his retinue, discharged many of his retainers, and sold the superfluous elephants and horses. He has done much good since the country has been under his management. A younger brother of the Rajah, Barchand Thakoor, resides at Agratolla. He has received the rudiments of an English education, and has been taught Chemistry, Medicine, and Photography, and amuses himself taking likenesses. He takes no part in business, and seems to have no influence whatever.

"The Court being composed of Bengaleęs, none of these men were willing, or would volunteer their services when an agent was required to accompany Mr. Ellison, and their reluctance to do so may be attributable to the difficulties they would have to encounter in an unexplored, uninhabited portion of the country through which Mr. Ellison pointed out to them on the map that the work would have to be conducted.

"On inquiry, Mr. Ellison learned that the country was uninhabited owing to the inroads of the Kachak Kookies, an Independent tribe, who leave their hills and fastnesses in the interior, and make frequent forays, plundering and murdering the Tipperah Rajah's people. The great dread of this savage and inhuman tribe causes such a panic throughout this portion of the country, that all the inhabitants deserted their villages and settled on the Frontier, or in the Cachar, Sylhet, and Comilla districts, and no persuasion will induce them to accompany a small detachment such as Mr. Ellison's was. With a large armed force able to repel any attack, these very people, formerly subjects of the Rajah of Tipperah, are ready to render every assistance, and to guide the forces, in order that the Kachak Kookies may be severely punished, nay exterminated from the country.

"There are several tribes in Independent Tipperah. The Kookies, Nagas, and [illegible] inhabit the hills and jungles. They select a locality for their village, clear [illegible]rrounding hills and valleys, and cultivate the rich virgin soil for two, [illegible]he utmost, four years, and then remove to some other equally favourable [illegible]v chiefly cultivate cotton, a fourth of which is given to the Rajah an[illegible]n and manufactured into coarse cloth for household use, and

further impeded by clouds and mists, and latterly by storms of such severity that on one occasion the whole of the Bunder Bazar, on the bank of the Soorma, was utterly destroyed and no vestige left. Final observations were taken for 19 principal triangles arranged in a double Series, extending over a direct distance of 62 miles, and covering an area of 1,207 square miles. Eight important Snowy Peaks of the Bhotan Himalayas were fixed.

16. During 1861-62, Mr. Lane was absent on leave on medical certificate, when his place was ably filled by Mr. W. C. Rossenrode, who extended the triangulation a direct distance of 89 miles Eastwards through Cachar towards Munnipoor, and 25 miles Southwards towards Independent Tipperah, in all 114 miles, by 30 triangles arranged in a double series covering an area of 2,024 square miles. Some of the stations were situated in the Jynteeapore District, but the observations at them were fortunately completed before the present rebellion broke out. Reciprocal observations had still to be taken to them from other stations around, necessitating the employment of Hindoostani clashees to work the signals on them; the men, though robbed and threatened, maintained their posts during the rebellion, and only came away when signalled to do so at the termination of the observations.

17. I have already reported (1) that on learning that the Bengal Government had ordered a Survey of Independent Tipperah to be made, I arranged with Mr. Buckland the Commissioner of Chittagong, for our Triangulation to be carried across Tipperah, on the direct line from Cherra Poonjee to Chittagong, instead of taking an extensive

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some pieces of cloth of better texture, as well as the surplus cotton, are taken to the nearest hant, or market, and exchanged for goats, pigs, fowls, or ornaments. They also cultivate rice, yams, and a gram termed chena (which grows only on these hills) for their own consumption. The Kookies and Nagas have no caste, they eat dogs and cats; in fact every animal and every bird is eaten. The Kookies of Assam, Cachar, Manipur, and Tipperah have different dialects, and the same may be said of the language of the Nagas of the above named places. The Tipperahs, in dress, appearance, and habits, resemble the inhabitants of Assam. They have their own language and are a low caste of Hindoos: from constant intercourse with the people of the plains they are more civilized, and understand Bengali. The Tipperahs are candid, straight-forward, cheerful, and of all the hill tribes met with on this side are most trustworthy and intelligent. The Kookies and Nagas are a sullen, morose, treacherous set, and cannot be conciliated or depended upon. They do not mix with their neighbours, and consequently retain their barbarism. The Kachar Kookies are an independent tribe, and nothing is known of them except that they make frequent incursions, rob, plunder, and murder the inhabitants."

progress, having in the two field seasons been carried from a point near Mittunkote, on the Indus line of levels, to the Dehra Dhoon base line, *aid* Bahawulpoor, Ferozepoor, Loodiana, Umballa, and Saharunpoor, and thence on to the Seronge base line in Central India, *vid* Meerut, Allygurh, and Gwalior, over a distance of 999 miles. In the course of these operations, stone bench marks were fixed at distances of 12 to 15 miles, and the most substantial milestones met with by the road side were also determined, for future reference by Canal or other Engineers engaged in levelling operations. A satisfactory connexion has been made with the Ganges and the Eastern Jumna Canal levels, and those of the Allahabad and Agra Railway, which are now capable of being reduced to the mean sea level as a common datum.

20. The COMPUTING OFFICE in Calcutta, under the superintendence of Baboo Radanath, chief computer, was engaged in completing the triplicate manuscript volumes of the general reports of the Parisnath, Hurilong, and Chendwar meridional series, and in furnishing elements for the various Topographical and Revenue Survey parties requiring them. In March last Baboo Radanath retired on a pension, after 30 years' service, during which he had repeatedly earned the approbation of the successive Surveyors General under whom he had served. On his resignation it was deemed advisable to remove the computing office from Calcutta to the Head Quarters of the Trigonometrical Survey at Dhera Dhoon, to bring it into more direct connexion with the Superintendent of the Department, and also with the field parties whose computations it has revised and collated.

21. The distant location of the computing office had entailed the formation of a small office at Head Quarters under the superintendence of J. B. N. Hennessey, Esq., 1st Assistant G. T. Survey, composed of Native Surveyors, and newly joined Sub-Assistants, who thus had an opportunity of being rigorously trained in the theoretical portion of their new duties. This little office has lately completed the triplicate manuscript copies of the general report of the North Eastern Longitudinal Triangulation between Dehra Dhoon and Purneah, in two thick imperial volumes; it has also been employed in revising the computations of the mountain triangulation of the North West Himalaya series, computing 3 volumes of the report of the Levelling operations, and preparing the triplicate general report of the Trans-Indus Frontier Survey, also in supplying elements, examining candidates, instructing new assistants, and other current work. On the transfer of the Calcutta

Office to Dehra, all but one of the old computers took their discharge, but freshmen have been entertained, and I have every reason to expect increased efficiency from the new computers, under the direction of Mr. Hennessey.

22. The Drawing Office, under the superintendence of W. H. Scott, Esq., Civil Assistant G. T. Survey, has been chiefly employed in compiling Maps of Kashmir, and Ladak, from the plane table sheets sent in by Captain Montgomerie. The first of these large maps has already been transmitted to the Home Government, the second is well advanced. Ten original preliminary charts of the triangulation in different parts of India have been forwarded for the use of the Surveyor General's Office, and duplicates have been prepared for the Geographer to the Secretary of State for India. Triplicate charts have also been constructed for the manuscript volumes of the General Report.

23. Between the completion of a Survey, in this country, and its publication, a long interval invariably elapses, during which even the Supreme and Local Governments are without access to valuable information, acquired, but unimpartible because of the costliness of manuscript maps and the time occupied in their construction. I have therefore been induced to attempt to employ photography for making rapid copies of our maps and charts, as a temporary substitute for the final engravings. This process has of late years been extensively adopted in the Ordnance Survey of Great Britain for reducing maps as a substitute for the pentagraph. Two complete sets of photographic apparatus were sent out to this country by the Secretary of State for India, for similar employment, and it is with one of these that I am endeavouring to have our maps copied. The operation is by no means easy, for the apparatus has had to be specially adapted to make full scale copies, and not reductions merely, for which it was originally intended, and the maps require to be drawn with special reference to future copying or reducing by photography. An ordinary finished map cannot be reduced without a large portion of the names becoming too microscopic to be easily legible. In the first Kashmir Map the rivers were coloured in blue, and the broken land and low hills in red, the higher ranges being in Indian ink. Consequently a phothograph of it would show no rivers, and would invert the depth of shading of the high and low hills, bringing the latter into excessive prominence.*

* A Map of Asia between the parallels of 20° and 60° on the scale of 100 geographical miles to the inch, has been recently compiled under my superintendence,

Annual Statement of Receipts and Disbursements on account of the Bombay Geographical Society, from 1st May 1861 to 30th April 1862.

Date.	Receipts.	Amount.	Date.	Disbursements.	Amount.
1861.		*Rs. a. p.*	1862.		*Rs. a. p.*
May 1	To Balance in the hands of the Treasurers on this date	306 9 11	April 30	By Cash paid to Office Establishment	605 15 6
,,	,, Ditto in the hands of the Secretaries..	393 5 2	,,	,, Do. forContingencies, Postages, &c.	330 7 4
,,	,, Government Subscription for 12 months.	600 0 0	,,	,, Do. for Printing the Catalogue of the Library, andCirculars, &c.	269 12 0
,,	,, Annual Subscription from Members, viz:—		,,	,, Do. for Binding Books of the Library	762 14 0
	On account of 1859-60 .....Rs. 45		,,	,, Do. Commission to the Treasurers, on payments Rs. 1,007 12 0 at 1 per cent.....	10 1 3
	Do. of 1860-61 ..... ,, 165				
	Do. of 1861-62 ..... ,, 585				
	Do. of 1862-63 ..... ,, 135		,,	,, Balance in the hands of the Treasurers on this date ....Rs. 114 6 6	
		930 0 0	,,	,, Do. in the hands of the joint Secretaries ..... ,, 185 7 4	
,,	,, Amount realized from the sale of Philosophical Intruments during the year:—				299 13 10
	On account of single Lens .... Rs. 1				
		1 0 0			
,,	,, Amount realized from the sale of the Society's Transactions	18 7 0			
,,	,, Interest at 4 per cent.....	20 9 10			
	Total Rupees....	2,278 15 11		Total Rupees....	2,278 15 11

Compared with Vouchers and found correct,
BHAWO DAJEE,

(Errors excepted)
D. J. KENNELLY,
Secretary, Bombay, Geographical Society.

TRANSACTIONS

OF THE

BOMBAY GEOGRAPHICAL SOCIETY.

ART. I.—*Particulars concerning the Runn of Kutch and the Country on its Southern Margin.* By Lieut. C. D. DODD. Communicated by Government.

[Read before the Society, September 20th, 1860.]

PERHAPS the following particulars concerning the Runn of Kutch and the country on its southern margin may prove of interest.

2. The northern frontier of this Province forms a bay containing, besides smaller tracts, the Runn Islands of the Khuren and the Puchum, between which and Kutch lies a long strip of pasture land termed the Bunee.

3. The hills, which fringe this frontier, have their steep sides toward the north, and in appearance greatly resemble the cliffs of a sea coast. From those in the Puchum Island, the Parkur mountains and a great portion of North Kutch can be observed. In the monsoon, owing to the inundation, the Runn appears precisely like a sea.

4. Besides the conglomerate termed Dokawana marble, out of which slabs and vases of a fine polish can be made, the Runn hills contain a variety of marine remains.

5. No rivers flow into the Runn from Kutch, its only feeders being nullas flooded during the freshes of the rains. The Lore nulla on the road from Bhooj to Begla is the only one which may detain a traveller for a few hours.

6. The routes across the Lesser Runn from Kutch into the eastern Districts of Kattywar are five in number, but from their having been described by the late Captain McMurdo, they need little notice, except the remark that on the one by Wurnoo to Teeken we pass at the former village the place where Murnajee Purmar, a Rajput chieftain, was slain in his bridal garments while pursuing a band of predatory coolies, who had carried off the cattle of his town. The dead bridegroom has been canonized, and the seat of his death is now a much worshipped shrine, where the ascetics show a stone cylinder, the usual symbol of the Hindoo God Shiva, and stoutly assert that it is the portion of the petrified trunk of a tree which once grew on the spot.

7. The routes by Shikarpoor and Wurnoo are the best. It should be borne in mind that, though the five routes during the monsoon can be traversed by Infantry at all times, by Cavalry with great difficulty, they are impassable to wheeled carriages. Quicksands are to be met with in this part of the Runn.

8. There are from Kutch two routes to Parkur by Beyla and Dadiane respectively. Though the latter is the shortest, the former is preferred, as it has stone-marks to guide the traveller by night, and the depth of the inundation is less—on this road for the first 5 miles proceeding from Kutch, the monsoon waters are about 5 feet deep, and after this, until the opposite bank is reached, the depth varies from six inches to three feet. The distance is 32 miles from bank to bank, and there is no spot to rest at the whole way, which could be easily obviated by the construction of a raised shed or mound—on a few occasions during the monsoon previous to a very heavy fall of rain, this passage is dangerous. A current sets in from the eastward, which has been known to carry people off their legs. It is usual, therefore, for persons desirous of crossing the Runn at this season to wait until rain has fallen before they commence their journey, as, however full the Runn may then become, there is no danger of a sudden rise in its waters. This route during the monsoon is impassable to carts. Infantry and Cavalry could cross with great difficulty. Laden camels travel the pass on emergent occasions, but to prevent their slipping, their forefeet are tied, and the journey, one in the fair season of a few hours, sometimes occupies two days.

9. The route across the Runn from Parkur to Soegaum, in the Pahlunpore territory, has a harder surface than other routes. The

Electric Telegraph line from Kurrachee follows this direction, and I may here remark that during the cold weather of 1860, the singular sight was observed of companies of dead flamingoes lying between the posts. These birds while flying by, might, at a low elevation in long irregular lines, have struck against the wire, and dropped dead along its course.

10. I now proceed to describe the Islands of the Khuren and the Puchum, the largest in the Great Runn, though little known to Europeans.

11. A hasty sketch of the Khuren was written by Lieut. Sleight, of the Bombay Engineers, in 1826; and in the following year Sir Alexander, then Lieutenant, Burnes, wrote a Military Memoir upon it. Neither of these papers are of general interest, as they were written with the object of providing protective measures against the predatory attacks of the Parkur tribes, whose inroads then annoyed North Cutch. The Khuren island is 24 miles long, by about 8 to 12 miles broad. It possesses one village, Guddia, two other hamlets, and a few collections of huts. It is generally sterile and bare of aspect, though patches of cultivation have increased in the level tracts. The wealth of its very scanty population consists of flocks, and Ghee is exported. The surface of the country is an imperceptible slope to the north, merging into broken ground at the foot of the hills overhanging the Runn, which is in altitude from about 800 feet on the eastern to near 100 on the western extremity of the Island.

12. Puchum is in figure an irregular square, with a side of about 17 miles; its surface rising into a high mountainous cliff at its north edge; shaving in the ground to its southern, a low range termed the Gora hills. The country is covered with brushwood and small patches of cultivation. The island has 12 villages, two only of which, Drobara and Khoura, deserve the name, the rest being hamlets. Three of the above belong to the Cutch Durbar, seven to the tribe of the Summas, and the remainder to other Mussulman tribes. Ghee and wool are the only articles of export. All the substantial dwellings in the Puchum and Khuren have mat roofings of mud and straw, the use of tiles being forbidden, it is said, by a certain holy man, whose memory, under the name of Gooroo Dutalie, is worshipped on the summit of the Puchum mountain, where his foot-prints are shown, but who seems to possess a shrine and a change of name in Cutch and Kattywar, for in

one place he is termed Runteed, in the other Junal Sha, being revered by both Mussulmans and Hindoos.

13. Eastward of both the Puchum and the Khuren, the village of Geeree, South of Beyla, is the residence of the chief of the Cutch Waghelas, a portion of the same clan which formerly possessed sovereignty at the ancient Wahilwara, now Puttan, near Deesa. Local tradition states the ancient name of Geeree to have been Verat Nuggur, and that 1,400 years ago it was a large town. It claims to have been the hiding place of the Pandoos, but it must contest this distinction with the modern Dholka in Guzerat. Beyond an ancient temple, with a stone bearing an inscription about 900 years old, there is at present nothing else of note in the place.

14. In the neighbourhood of Geeree, the Padrias, supposed to be a branch of the Parkur clan of Sodas, ruled before the Waghelas ; and in their time it is stated that the going out of Sindhul, a scion of the same family, into the Khuren took place, where his descendants still reside to this day, and who on his entry overthrew the Murrums, a race reported to have held supremacy along the southern edge of the Runn, conjointly with the Katties, which tribe, emigrating to Kattywar at the close of the 14th century, gave a modern name to that province. Except a tradition that they came from the west, little is known of the "Murrums;" and, though no mention is made of them among the people between whom Kutch was divided on the eruption from Sind of the present ruling Jharejas, it is nevertheless confidently stated that previous to this, when they governed in the Puchum, the Runn was a sea; and near the village of Drobana in that island the site of a harbour, where customs were levied, is still pointed out.

15. At the western extremity of the Khuren are shown the remains of a town called Kotia, where, previous to the entry of the Murrums, a Rhatore Rajput is said to have ruled, in whose time the present desert was a sea. Close here rises a high and solitary hill from the midst of the Runn, under the lee of which vessels rode during stormy weather. In the monsoon the channel at this place, between the two islands of the Khuren and the Puchum, has a depth of about 7 feet; and no part of the Runn, from its aspect, more reminds the traveller than this of its former condition.

16. It is stated by the Summas of the Puchum, the progenitors of the present tribe of Jharejas, that the Runn was navigable 300 years before

their entry into Kutch, which, according to a note in Raikes's Memoir on the Province, page 9, may be assumed to have been at the beginning of the 14th century; but so little is accurately known about the events of this period, that we can only remark the general coincidence between this time and that assigned to the sway of the Murrums, and the Rhatore chieftains' rule, with the native tradition that the Runn was dried up by the miraculous powers of a saint named Dhoranath, who is supposed to have lived in the 11th or 12th century of the Christian era.

17. All our information would lead us to believe that the conversion of the Runn into its present condition was gradual, for which Captain McMurdo, writing in 1815, mentions that Khora village, 2 miles east of Teekur, in the Gulf of Kutch, was a seaport 50 years previous. The remains of Pali Nuggur, now Veerawow, in Parkur, known to have been a port, with the length of time that it is apparent must have elapsed since its decay, are quite sufficient to show that the sea receded from its neighbourhood at a much more anterior date than it did from the country on the more southern parts of the Runn.

18. Though the Bunnee is a grassy land, there is a tradition that it was once a Runn, and it possesses patches of the same nature as that waste subject to inundations. It is recorded that after the subsidence of the floods in 1851, a large portion of the Runn, near the village of Nerona, became culturable land. I may add that the Bunnee gives pasture for more flocks than any other part of Kutch, and among the inhabitants there exists the singular custom of using no sleeping cots, and of lighting no lamp after dark, both luxuries, it is said, having been forbidden by certain holy men; and I am informed that the Rao of Kutch, when journeying through this inhospitable region, slept on a pallet spread over the bare ground.

19. The saltness of the Runn soil is due to the annual eruption of the sea during the monsoon, and in the north frontier of Kutch there are many long and narrow bays, which a bar at their mouths would keep dry and recover for use; and while this will be apparent to any one who inspects the map, he will also observe that the portion east of the Puchum Island, which latter is almost joined with the opposite bank by a series of islands, could be saved by the construction of bunds between these, and also at the eastern outlets of the Runn respectively. Yet it is believed that the catastrophe of the conversion of the Runn passed unheeded since the region convulsed, after being once fertile, had become sterile from want of irrigation.

20. Changes have taken place among the feræ naturæ of the Runn neighbourhood. Thirty years ago Burnes wrote that lions, bears, tigers, and wolves were to be found north of Bhooj; none, with the exception of the latter species, now are visible; the only instance being the shooting on the Runn, near Beyla, of a solitary lion, which it is supposed must have wandered from the Province of Kattywar.

21. The wild ass, or "onager" of the ancients, is the only inhabitant of the Runn, and in relating the following I merely repeat the information prevalent among the natives. The ass is found in small flocks, composed of one male, several females, and the remaining animals devoid of the organs of generation. It is stated that on the males arriving to maturity, they fight for the mastery, when the victor emasculates the vanquished, who follow afterward in his track.

ART. II.—*Memorandum on the Eastern Portion of Kutch, called Wagur.* By Lieutenant C. D. J. DODD, late Adjutant of the Kutch Levy.

[Read before the Society, October 18th, 1860.]

Memorandum on Wagur.

1. WAGUR is the name of the Eastern portion of the Native State of Kutch.

2. Its appellation is stated by some to have been derived from the word "Wangud," (वांगड) quarrelsome, a term well-deserved of old by its inhabitants from the anarchy that always prevailed.

3. Its boundaries are to the north of the great Runn, to the east the Lesser Runn, to the south a portion of the Gulf of Kutch, and to the west the longitude of the village of Doodai, 24 miles east of Bhooj.

4. It is in shape a peninsula, about 60 miles in length by 15 miles in breadth at its narrowest, and near 40 miles at its widest part.

5. The prevailing features of the district are extensive plains, with detached hills, but in the centre there is a hilly tract, to the north of which the ground slightly undulates until it terminates in cliffs on the edge of the Runn, while to the south it is a perfect level.

6. There are no rivers, and all the water-courses, only flooded during the rains, take their rise in the central highland, whence they trend in a north and south direction.

7. While there are no made roads, the route from Marwar, &c., *viâ* Ardysir to Mandavee, is one considerably travelled over, and much frequented by pilgrims proceeding to Dwarka.

8. The soil does not materially differ from that of other parts of Kutch, but in the north and north-eastern portions, where, along the edges and islets of the Runn, are grass lands, there is not so much cultivation as in other parts, which are not so rocky, and possess a deeper stratum of earth.

9. The grains produced are Bajree, Mut, Gowar, Jowaree, Moong, &c.; and Cotton is grown principally in the south part.

10. As irrigation is carried on solely from wells, the other crops are dependent on the fall of rain; but there appears a general neglect of all artificial means for storing water, which the slope of the country affords facilities for doing.

11. The climate of Wagur is hotter than other parts of Kutch.

12. While the only natural product of the district is iron in its hills, which is not now worked, the only industrial product is cloth of kinds, manufactured at some of the villages, the most worthy of note being "Modyoon," of thicker texture and superior quality to the country-made cotton-stuff of the Deccan.

13. Previous to the entry of the present ruling race of Jharejas into Kutch, after which its history is contained in that of the Province, Wugur was possessed by the Waghelas, who were driven into the north part of the district by the intruders, where they still remain. Kunkote is supposed to have been the principal seat of their power, and it is stated that its rulers were tributary to the kings of Unhilvara.

14. Jhareja, Waghela, and other Rajpoots of various tribes, with cultivators and a few nomadic classes of Sindhi extraction, principally compose the population, but the great number of coolies in Wagur, compared to the other parts of Kutch, where they are not found, will account for the greater prevalence of crime.

15. The fortified walls of the villages in Wagur have been either levelled or partially destroyed, and the following are the only places which are defensible against a *coup-de-main*, or would require artillery to assail:—

Names.	*Remarks.*
Beyla	Outer wall in ruins, but inner fortlet strong and defensible.
Cheetrore.....	Wall in ruins. At S.E. angle a four-walled fort, with towers, in good order.
Ardysir	Wall dilapidated, but defensible.
Adhoi	Strong walled village, with towers, in good repair.
Futtehgud	Small fort, on a height.
Badurgud	Ditto ditto.
Butchow	Ditto ditto.

16. Wagur is divided into lands belonging to the Kutch Durbar or its feudatories, but Adhoi and the village of Jinghee is possessed by the Thakor of Morvee in Kattywar.* The Durbar revenue is collected by functionaries located at the places† below noted.

17. The principal feudatories are the Chiefs of—

Jharejas.	*Waghelas.*
Kunkote.	Geeree.
Cheetrore.	Beyla.
Wandia.	Lodrani.
Ardysir.	Palanswah.
Lakreea.	Jatawarra.
Kanmeer.	
Sunwah.	

* In all there are 7 Morvee villages in Wagur, and that of Amurdee is a distinct one from Adhoi, its sovereignty belonging to Kutch, and its revenue to Morvee.

† Rhapoor, Futtehgud, Shikarpoor, Doodai, Butchow.

ART. III.—*A short Account of the Forests in the Peruvian Province of Caravaya, whence the Quinine-yielding Cinchona Plants are procured for introduction into India.*—By C. R. MARKHAM, Esq. F.R.G.S.

[Read before the Society, November 15th, 1860.]

THE service upon which I have lately been employed to collect plants of the quinine-yielding cinchona-trees, in South America, for introduction into India, led me to a part of Peru which is very little known, and of which there is, as yet, no map. I have thought it probable that a brief account of this region may prove of interest to the Members of the Bombay Geographical Society, especially as on its resemblance, in climate, elevation above the sea, and vegetation, to the mountainous regions of Southern India, mainly depends the successful introduction into India of the plant yielding perhaps the most indispensable drug which is used in the tropics.

This part of Peru is situated between latitudes about 13° and 15° south, and includes a narrow strip of lofty table-land,—the splendid snowy range of the Eastern Andes for a length of 180 miles, and the boundless forests stretching away to the eastward, towards the frontier of Brazil. It is known as the province of Caravaya, and is bounded on the south by the Republic of Bolivia.

Caravaya (or Colla-huaya, as it is more correctly spelt by the old Inca historian, Garcilasso de la Vega) became famous immediately after the Spanish conquest of Peru, for the prolific gold washings in its numerous rivers, which all contribute to swell the mighty Amazons. Many traditions are still extant of the enormous wealth collected by certain Portuguese Mulattoes, who fled into the forests of Caravaya, towards the end of the sixteenth century. They are said to have sent a nugget resembling a bullock's tongue to Charles V., which was lost at sea. They then sent a lump of gold, of the size and shape of a bullock's head, which arrived in safety. The Emperor in recompense offered to comply with any request which might be made by the Mulattoes; and

they asked for the privilege of entering every town on white mules with red trappings, and that the bells of all the churches might be set ringing. Three towns founded in those early times, named Sandia, San Gavan, and San Juan del Oro, were created "royal cities of the golden province of Caravaya" by the same monarch. But there were other settled inhabitants of Caravaya, besides Spanish and Mulatto gold diggers; a fierce tribe of wild Indians called "Chunchos" range the forests; the descendants of the Spanish conquerors lost the valour and the prowess of their sires; the Chunchos encroached more and more; the strangers were driven up into the ravines of the Andes; and the royal cities of San Gavan and San Juan del Oro are now replaced by a tangled forest. Sandia, a small half-deserted village, alone remains of the settlements which received such pompous titles from Charles V.

In more modern times a few feeble attempts have been made to encroach on the virgin forests, and there are some coca and coffee plantations, but they never extend beyond the ravines formed by the spurs of the Andes. About eleven years ago, however, the rage of gold digging broke out afresh. Adventurers flocked from all parts of South America, and during the following years the courses of several of the rivers were explored for considerable distances. All the streams which flow from the eastern slope of the Andes are, in this region, more or less charged with gold, both in dust and in small lumps.

The snowy range of Caravaya, the most eastern cordillera of the Andes, rises abruptly from the lofty table-land of Lake Titicaca* in sharp needle-like peaks. This range forms the water-shed between the Lake of Titicaca and the Atlantic, and from the summits of its passes (14,000 feet above the sea) there is a very abrupt descent into the warm valleys to the eastward. I commenced this descent last April, by a pass in latitude 14° 20′ S. and longitude about 74° 70′ W. which leads down to the ravine or narrow valley of Sandia. A black perpendicular cliff, at least 2,000 feet high, formed one side of the descent. The space on its western side is occupied by an extensive glacier, the first I had seen in the Andes, whence a long, slender waterfall descends, and rushes down the ravine, forming one of the sources of the river of Sandia.

From this spot the village of Sandia† is distant 31 miles; the summit of the pass is 13,700 feet, and Sandia itself 6,667 feet above the

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* Two Quichua words,—*Titi*, lead; *Caca*, a rock.

† *Sandia*, a corruption of the Spanish *Sandilla* (a water-melon).

level of the sea, so that in this 31 miles there is a descent of 7,033.* In this pass the scenery is surpassingly beautiful. The polished surfaces of the cliffs glitter here and there with falls of water, some like lines of silver-thread, others broader and breaking over rocks; others seeming to burst out of the mist, white jagged peaks, some black and frowning; others white with snow, pierce the stratum of fleecy clouds. Approaching Sandia the stream in the centre of the ravine becomes a roaring torrent, dashing over huge rocks. On either side vast masses of dark frowning mountains rise abruptly for several thousand feet, ending in fantastically-shaped snowy peaks. The vegetation becomes richer with the descent. Masses of ferns of every shape, calceolarias, lupins, salvias, celsias, and begonias. Glorious waterfalls pour down the mountains on every side: some in a continuous white sheet of foam for hundreds of feet, finally plunging into huge beds of ferns and flowers. The scenery is enchanting, but the road is like a steep, black, attic staircase, after an earthquake. Here and there, are terraces up the sides of the cliffs, where maize and potatoes are cultivated, and the Indians live in huts perched up in almost inaccessible ledges. Beyond Sandia the ravine continues to be very narrow, bounded by long spurs of the Andes for 80 or 90 miles, when it finally opens out upon the vast forest-covered plains of the interior of South America.

The climate of the Sandia ravine, in April, is exceedingly agreeable. The days are fine and clear until late in the afternoon, and not too hot. The prevailing wind blows up the ravine from the N.E., being the trade-wind which comes across the continent from the Atlantic. It is this warm trade-wind which produces a much milder climate, and more tropical vegetation on the eastern than on the western slopes of the Andes, which face the Pacific at corresponding elevations.

It is in descending the ravine, beyond Sandia, that the first cinchona-plants are met with, being the shrubby variety of the *calisaya*, the most valuable species. The rock is a hard schist, much discoluored with oxide of iron, with veins of very pure white quartz running through it. It forms, at some places, into perpendicular cliffs of stupendous height, crowned by grassy slopes or *pajonales*, as they are called, far above the tropical vegetation of the ravine.

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* These heights were taken with a boiling-point thermometer.

This grass region is cut up by shallow gullies containing many beautiful flowering shrubs. A bright orange-flowered cassia; a melastoma, with masses of purple flowers; two kinds of arbutus; and the shrubby variety of the *cinchona calisaya*.

In many parts of the ravine there are coffee plantations, and stone-faced terraces of coca *(erithoxylon coca)* rise up tier after tier, fringed with maiden-hair and begonias, and are filled with the delicate coca-plant. These rows of terraces are frequently broken by a gully, bright with the purple flowers of the melastoma; while the river is shaded by tree ferns, bananas, and bamboos.

To reach the forests, where the tree cinchonas grow, it was necessary to leave the beautiful Sandia ravine, and cross a succession of steep grassy slopes of the Andes towards the S.E. From these elevated spots there are magnificent views. Snowy peaks, rising above a sea of mountain ridges, form a background; and the foreground generally presents a very pleasant landscape. The broad expanse of rich grass (*stipa yehu*), which is interspersed with a graceful white lily, is dotted in all directions with thickets; some in gullies and water-courses, and others in clumps like those in an English park. Palms and tree ferns raise their graceful heads above the rest of the trees. These thickets also contain the shrub *calisaya*, and another species of cinchona called *caravayensis*, incense-trees, melastomas, arbutus, with red and white flowers, and a crimson pentstemon.

After travelling, for two days, across those elevated *pajonales*, I descended into the forest-covered ravine of Tambopata,* the upper part of which alone is inhabited by a few Indians. Descending the river for a few miles, the virgin forest commences, without a trace of a human beings, which spreads away for thousands of miles to the shores of the Atlantic. The ravine of Tambopata is close to the frontier of Bolivia.

It was in the Tambopata forests that the cinchona-plants, of the species *calisaya* and *ovata*, were collected, which have now arrived in India. They are rather rare in their native forests, and I was occupied for some weeks in searching for them, and struggling with great difficulty through the dense thickets of bamboo and underwood. In the performance of this service, I had to penetrate where no European had been before, and no human being for 13 years,—where there is no road, and a dense matted forest. I had to suffer excessive fatigue and

* *Tambo*, a traveller's hut; *Pata*, a hill.

hunger; in danger of starvation if my provisions ran out before I could return to the first clearing, which was indeed the case; in danger from being constantly wet through—from venomous snakes and savage Chuncho Indians; and from the risk of accidents without the possibility of help. I had but a slender stock of provisions, consisting of stale toasted bread, chocolate, and toasted cheese; and I was accompanied by an English gardener and five Indians. Every day was one of excessive fatigue; and the forest was so dense, that our encampment could only be made on little stony beaches, which occurred here and there, formed by the windings of the Tambopata river.

The forest scenery was truly magnificent: mountains rising up from the river on either side, covered with trees and underwood, to a height of 2,000 or 3,000 feet, and ending in rocky peaks. At one spot the river boils over huge rocks between two precipices which rise to a height of 750 feet perpendicularly from the water; their sides are clothed with the *cinchona calisaya*, while many other beautiful trees, amongst others the *mimosa irga* with its cottony fruit, droop over the boiling waves.

One of these precipices had to be ascended by a frightful kind of ladder, of ledges in the rocks, or half-rotten branches of trees; here and there, crossing a yawning chasm on half-rotten stems of tree ferns.

The precipice is in the centre of the cinchona region. Here are the *cinchona micrantha* on the margin of the river, with the *huinapu*, which I believe to be a new variety of the *C. pubescens;* higher up is the *C. calisaya*, and still higher the *C. ovata*. Of the other trees of this forest the number and variety is bewildering. Enormous trees with huge buttressed trunks, others sending down tendrils from the branches, the gigantic balsam-tree, the India-rubber tree, and many others. A list of the ferns, endless in size and shape, from lofty trees to tiny creepers, would fill a volume; of the palms there is a great variety, most of them as yet undescribed. The tall *chonta*, with very hard timber; the slender beautiful *chinilla;* the towering *muruna*, with its roots shooting out in every direction from six feet above the ground, and ragged leaves; the thorny *chaquisapa;* the graceful *sumballu*, with an edible fruit and long bristles on the stem; the gigantic *sayal*, with enormous leaves, at least 30 feet in length, the inner fibres exactly resembling black wool; and many others.

In so dense a forest it is not very easy to see much of animal life. Lower down, where the river becomes more broad and tranquil, the great

heavy tapir is often met with, and herds of wild hogs, called *peccaries*, frequent the clearings where edible roots are to be had. They come down in droves of 30 or 40 during the night, forming a broad track through the forest, leading to their lurking-place, which is generally in a long low cave. They are small and round backed, some leaden coloured, others black and white. Jaguars, ounces, and bears are also common. The forest is also full of large apes called *zambos*, and monkeys. Of birds there are green parrots, wild turkeys, pigeons, rose-coloured hawks, a bright yellow and black crow; and the *tunqui* with gorgeous orange crimson plumage on the head, neck, and breast,—black wings and high crimson crest. There are several kinds of venomous snakes, which are very frequently met with in April and May, when the rains have ended. The enormous variety of splendid butterflies and moths is very striking.

The river of Tambopata, as well as that of Sandia, after a course of nearly a hundred miles, flows out into the forest-covered plains; and uniting with many other rivers which flow down from the eastern slopes of the Andes to the northward, forms a great and almost unknown river called Ynambari. The Ynambari again unites with another great system of rivers further to the northward, flowing from the mountains to the eastward of the ancient city of Cuzco; and the confluence of the whole of these numerous rivers forms the mighty stream, which, at its mouth, where it falls into the Amazons, is known as the river Purûs; it is, I believe, the largest secondary river in the world. It is true that 800 miles of the lower part of its course has never been explored, but the evidence is so strong, that there can be little doubt that the rivers of Caravaya are the sources of that great unknown tributary of the Amazons—the *Purus*.*

During my wanderings in Caravaya, I obtained one fixed position at Crucero, the capital of the province, on the western side of the Andes, 12,987 feet above the sea, and collected materials for a map by constantly taking cross-bearings, and obtaining a true bearing every two or three days. As yet no map has been made of the Caravaya region.

While I was collecting the cinchona-plants the authorities of Quiaca, one of the districts of Caravaya, discovered the object of my expedition, and sent orders that I should be seized, and that my collection of plants

* This subject is fully discussed in my work, Cuzco and Lima (Chapman and Hull, 1855), Chapter VII. Also in a paper read by me, before the Royal Geographical Society, on the River Purus, in November 1854.

should be destroyed. I, therefore, was obliged to make a rapid retreat to the sea-coast; and, after surmounting numerous obstacles, especially in procuring mules, I succeeded in doing so. It was no easy matter to extricate any collection of plants from the authorities of Sandia; but it is unnecessary to enter into details, and eventually I crossed the snowy range of Caravaya by another route from that by which I had entered the forests, and commenced my journey towards the coast, carefully avoiding every town or village in order to escape detention, as a hue and cry, raised by a meddling Peruvian named Martel, had preceded me.

In this part of South America, the Andes are divided into two parallel ranges, with a wide and lofty table-land between them, in the centre of which is the great lake of Titicaca, 90 miles in length. I descended into this table-land, which is from 14,000 to 12,000 feet above the sea, after crossing a difficult pass of the Caravayan-range at an elevation of 17,700 feet. My heart sank within me for the plants, when I saw the grassy plains covered with stiff white frost. Every day I was ten or twelve hours in the saddle, resting at night in the huts of Indians, three feet high, thatched with long grass, and built of loose round stones, which let in the freezing wind in every direction. During the night the thermometer was down to 20°, and once to 13°. The only inhabitants of these wild solitudes are the graceful *vicuna*, the antelope of the Andes; the *biscaches*, a kind of large burrowing rabbit; and the *huallatas*, or large geese, on the margins of streams or pools of water.

The breadth of the Titicaca table-land, from the pass over the Caravaya-range,* to that over maritime cordillera of the Andes,† is 280 miles. It is a region abounding in good pasture covered with numerous flocks of sheep, llamas, and alpacas, with several large rivers flowing from either cordillera into the lake, but it is almost entirely destitute of timber.

The loftiest part of the pass which crosses the maritime cordillera of the Andes is 15,500 feet above the sea;‡ whence, by a very gradual descent, the mule-track leads down to the city of Arequipa, which is situated at the foot of a snow-capped volcano, 20,000 feet above the sea. The bleak plains, over which the road passes, are, in the month of May, hard frozen, and furious gales of wind sweep over them. From Arequipa to the Pacific Ocean the distance is 90 miles over a sandy

* Called *Poti*.

† Called *Alto de Toledo*.

‡ The *Alto de Toledo*.

desert, but at length all these difficulties were surmounted, and the plants arrived safely on the coast of the Pacific.

It must not be supposed that the difficulties of the undertaking ended here. Serious objections were raised to the embarkation of the plants, by the Peruvian Government, several underhand attempts were made to destroy them, and constant vigilance was necessary to preserve them from destruction; but this is not a place for entering into further particulars.

The plants were put on board a steamer at the Peruvian port of Islay on the 24th of June, and reached the Neilgherry hills on the 12th of October 1860.

It will be remembered that the *pajonales*, or grassy slopes of the Andes, where the shrub variety of *cinchona calisaya* is met with, are 6,000 to 7,000 feet above the level of the sea, or at a little lower elevation than the Neilgherry hills, which are, however, nearly three degrees nearer the equator. The *pajonales* are throughout the year constantly visited by mists and light rain, and this state of the atmosphere is also to be found in some of the higher ravines of the Neilgherries. The soil of the Neilgherries is much richer than that of the cinchona regions of Caravaya, and the vegetation is analogous. There is every reason, therefore, to hope that cinchona plantations may be successfully cultivated in the hills of Southern India, including the Neilgherries, Pulneys, Travancore hills, Wynauds, and also in the mountainous parts of Ceylon. I am inclined to doubt whether they would succeed so well in the hills of the Bombay Presidency, on account of the excessive rains during the prevalence of the S.W. monsoon; and the absence of moisture during the rest of the year. Cinchona-plants require constant, but not too much moisture, and an equable temperature. The experiment, however, should be tried wherever there is any chance of its success.

It is probable, that like coffee and cinnamon, the cinchona, when cultivated, will prove most productive in its shrubby form, and at the greatest elevation that its nature will allow: that in a given space, the shrub (of the same species) will yield more bark than the tree cinchona, and that the bark of the shrub will contain a larger per centage of alkaloids.

In this brief paper I have endeavoured to give some idea of the country whence these plants were procured, and of the great difficulties I had to overcome in obtaining them. That they will be successfully introduced into India, and that a great benefit will thus be conferred on

the country, there is now little doubt; and I sincerely trust that this short account of the region from whence they come, may prove interesting to the members of the Bombay Geographical Society.

NOTE.—The cinchona region ranges along the tropical slopes of the Andes, from 20° S. to 10° N.

In New Granada.—C. Pitayensis, C. Lancifolia,* C. Cordifolia. In Ecuador.—C. Condaminea,* C. Lancifolia,* C. Succirubra.* In Northern Peru.—C. Nitida,* C. Glandulifera,* C. Micrantha.* In Caravaya and Bolivia.—C. Calisaya,† C. Boliviana,† C. Ovata Communis,† C. Ovata. B. Rufinervis.†	Valuable species of Cinchonæ.

I have, with the sanction of the Secretary of State for India, employed Mr. Spruce in Ecuador, and Pritchett in Northern Peru, to procure the valuable species which grow in those regions.

Of the plants already arrived, upwards of 50 of the cuttings, and 10 of the original plants, are growing.

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* Expected to arrive in India. † Arrived in India.

Art. IV.—*Notes upon the Hydrography and Geography of Japan.*

By Lieutenant G. T. Robinson, H.M.I.N.

[Read before the Society, December 20th, 1860.]

The working of the existing treaties between foreigners and the court of Japan, and the rapidly-increasing foreign commerce resulting therefrom, renders it essential that every information respecting this unknown region should be published for the benefit of the mercantile world.

At present Nagasaki and Huka Hama are the principal ports of trade. Hakodadi has but little foreign trade. Nagasaki has been surveyed, and its approach is unattended with much risk; but much is still left to be done: the coast, north and south of the port of Nagasaki, is quite unsurveyed, the Gotto Islands are not laid down by observation, and Cape Gotto, the only fixed point, is east of its proper position five miles, while the islands immediately east of that Cape, require to be fixed in, and *south* of their present position, or in a transit line between Cape Gotto and Nagasaki. From Nagasaki to Van Diemen Straits is very imperfectly known, the Island of Amakusa being too far east of its proper position. In Van Diemen Straits many rocks have yet to be laid down between Shanghae and Nagasaki. Storms are frequent and much thick, wet weather prevails.

The coast N.N.E. of the Straits of Van Diemen is laid down too far west, and from Cape Chichakoff to Cape Murodono, crossing the Baungo Channel, the coast is quite unknown, currents uncertain, but generally with an inshore set, and cyclones by no means unfrequent. From O'Sima the eastern cape of the Kine Channel to Cape Idsee, on into the Bay of Yeddo, is the most critical part of this coast, so much so, that in their own charts the Japanese mark it with a broad black line. Here the currents are strong, the land high and bold to approach (*in fine weather*), possessing fine harbours known only to the Japanese.

[illegible] of Idsee is a large straggling group of islands, the Brissees or [illegible]n Islands, totally unsurveyed, beset with rapid currents, and right fair way between Van Diemen Straits and Yeddo Bay, with the

Bet lasts for about a kos. I found here my second horse; the groom left shivering all night, because every one forgot to take wood with the camels, in spite of frequent orders so to do.

N.B.—In hot weather to remember especially a supply of water.

In cold ditto of wood .. } at both horse stations.
In both ditto of hay .. }

The first and last only were remembered, so a little half-dried camel or cattle dung and scanty thorns, were the only things forthcoming to keep my two men from freezing in the bleak plain.

Further *N.B.*, to post the horse in the middle of the Bet, where there are some trees, and more chance of fuel than at the end where I found mine.

Hence to the Dera Bet, is called 7 kos; Runn pretty hard and level all the way: not far from the former, crossed a crack in the Runn, constituting a monsoon nullah, commencing apparently half a mile further west, with the slope towards the east. They tell me it empties itself into the Runn, near Adesir, and so round into the Gulf of Kutch.

Dera Bet is said to have been raised from the Runn by the earthquake of 1819. Here I found my third horse. This Bet lasts about a mile odd, and resembles the other in character. Hence to the sand hills of Sind, is 3 kos of firm level Runn, only scantily cut up with cattle tracks. These sand hills constitute what the Gujaratees call and write the Thul, from the Sanskrit, *Sthul* (place, &c.: the diverse watering-places are called Thurrs, whence the extension of the name to the district); but the people thereof call it Thurr. One kos of these sand waves, and crossing their ridges, brought me to Baliaree.

The sand ridges run E. and W. (I regret not having observed them by compass, but my impression is that they face a little easterly of south), and resemble the waves of an Atlantic Ocean tempest, but higher and further apart. Reached Baliaree at 10 A.M., distance 16 kos, but above 32 miles, I think. Baliaree is a kaffir-looking krawl of about 60 mud huts, near to and north of the remains of a mud fort. It is situated in the valley between the third and fourth sand ridge from the Runn: a deputy Kardar is here located.

This Thurr, for the whole is of the same character, is one of the most wretched countries in the world. The valley beyond the first ridge contains two small lakes; the road skirts the east end of one about a mile in circuit; the other is visible further west, a mile or two distant; and a third faintly beyond. There are said to be several such in this valley,

and all like brine. The horse sinks fetlock deep in sand as he trudges along; the ground is perforated with countless rat-holes on either side the path; and one everywhere sees the dun-coloured, little vermin skipping about, and popping their heads in and out of these holes—the soil being just sufficiently glued together by the grass and shrubs to admit of their remaining unfilled, so long as no one tramples on them. Coarse-looking grass, stunted bushes, camel-thorn, and milk-bush are scattered over the country,—such is the Thurr. I did not meet one traveller, man or beast, whilst crossing the Runn; and only overtook two, a Soda Rajpoot of the Thurr, on a camel, led by his attendant on foot: he had been to Moondra in Kutch on a marriage occasion, though good-looking, he was dull and stupid, and his man no better.

On the whole, the Runn is as good an imitation of a desert, as could well be invented, but it is a paradise for travellers (except in the rains), compared to this wretched sand country. The British letter-post formerly traversed this line of route, and some few of the poles erected to guide the runners in the Runn are still standing. They must have had a troublesome time of it in the rain, and at night with tenacious mud under foot.

A stone is a rare thing in the Thurr. The pious Mosslemen of Baliaree, who have placed their burying ground on the top of the highest sand hill, near the village, have built their tombs of flat burnt brick. The mud for the walls of their fort, and I should say houses, but many are mere grass hives, is excavated from the tank at the bottom of the valley in which the village stands, the water of which is tolerably good but muddy. This last monsoon the rain was so heavy that it washed down part of the southern sand ridge, a quarter of a mile from the village. I went to examine it, but though the ridge has been nearly cloven through, nothing but sand and sand-clay is visible in a cleft near thirty feet high, and reaching a hundred yards.

N.B.—My dressing valet and another servant, who stopped behind and rode on my sandnee camel, lost their way *branching* off at the Dera Bet, somewhat westerly to Vingar, five or six kos from this, and so came up two or three hours after their proper time. Hence, directions would seem needful for strangers. I observed no other trace of route as I came along, but they describe the Vingar road as a well travelled one.

Thermometer in my tent, 3 P.M., 75°. Deepla, Thursday, 15th January 1852.

Thermometer at 4½ A.M., *in* my tent at Baliaree 49°, outside 43°. Did not leave it, however, till 6, mounting my sandnee camel driven by Mr. Pithoo, and reaching Deepla, six kos, at 9 A.M., this giving four-miles-an-hour pace. The country the whole way the same as that described. A succession of ridges and vallies all of sand, but tolerably well sprinkled over with bushes and tufts of coarse grass; about half way passed, leaving on the right hand a small salt lake, so my guide the Khosa horseman told me; but I observed duck and other *fresh-water* birds upon it, and a little further on, close by on the left hand, a larger lake, called Sun, which he said was salter, with no vestige of life on it, but so singularly placid that I could not observe the line in some places between the opposite hills and their shadow. Passed on the road only one miserable-looking hamlet, and neither overtook nor met a single traveller.

Deepla is the chief town of the district, and the seat of a Kardar; it has the remains of two mud forts, the walls rendered less crumbling by roots and trunks of trees, though where the wood came from is a puzzle. They were thrown down I was told by the British force, that occupied this during the late Sind war. The town is a mere village, a perfect kaffir krawl, containing 135 huts, low mud walls and sloping bee-hive thatch: some are flat roofed. Under this *metropolis* are two Zillas, viz. those of Deepla, or, as the Kardar informs me, Deepla and Bilharee, more commonly called, though not so spelt, Baliaree; it controls 224 villages, but 100 of these are insignificant cowherd hamlets, and the villages themselves in any other country would be deemed so also. The staple of the country is bajree and wheat. The kardar is an intelligent young Joonagur Rhadunpoor Nagur Bramin, named Prabhoo Lál, distantly related, he tells me, to my friends the Gaikwar Mujmoodar of Kattay-war, Bridas and Kallian Rao. Small bodies of the Khosa horse are stationed here, and at Baliaree, in support of authority, and for general police purposes. The country was formerly a nest of thieves, but English rule has established order for anarchy.

Pithoo, who drove me hither, told me two things new to me, to wit:—1st, that bears eat mice; 2nd, that the camel knows no home however fed there, but when put out to graze, wanders anywhere. As to the first fact, he had been an eye-witness. On asking the owner of a bear brought to Bhooj, what he fed him on, he replied, "You shall see him catch his own game;" whereupon he took the beast to the nearest rat-holes. The bear began his operations by filling up several

with his claws, after which he put his muzzle to one hole and began blowing and bellowing; almost in an instant three rats ran out as it were into his month. If this be a true tale it seems new to zoologists.

In the evening the town's folk gathered round me after my stroll upon the ruins of the old fort, which I rather encouraged. The Khosas seem a manly race; none of the Hindoo servility, or even politeness, in their address; free-and-easy sort of fellows. One youth of twenty said, "I am Sirdar Khan," with an air as though I must know all about him. Not possessing this fulness of knowledge, I inquired, and was told that his father Shadee Khan was the leader of the band of seventeen who had all perished during the Nuggur Parker expedition, rather than surrender their arms after being taken prisoners. "In my father's time," the youth said, "we ate plenty of anything we wished to lay hands on: now I want service to enable me to eat." One man asked me if I knew a remedy for his sick horse; another for his sore foot. Two persons, originally landholders, now looked the picture of misery, brought about, they admitted, partly by opium, but mainly by their bad fate. None knew how to read or write, and there were no means of instruction in this capital of the western Thurr.

Friday, 16th January 1852. Wanga, pronounced Wunga, Bazar. Two or three wells, and as many huts somewhere near, but not visible, are called Somrace Khoee, 6½ kos off. Here I took precautions to have some wood and hay ready at a resting place for horses and people on the tedious march of the day.

Left at 4 A.M. Thermometer outside tent 38°, but bitter cold and with a tendency downwards. This sandy country lasts for ten kos, and is of the same character as the rest, with rather more bushes—some growing even into trees, and the sand hills somewhat higher perhaps, though the path avoids them by a corkscrew direction. It is truly a tedious march for man and beast, camels to a certain extent excepted, so I rode all the way on my sandnee, with a new man as driver, one Mansingjee, a Soda Rajpoot, said to be skilful in camel matters, and therefore entertained at Deepla to drive and tend my suwaree camel. He certainly seems to understand the beast and its ways. Though only a Peon, and giving up his belt to a brother, yet is he a Soda, a petty landholder, and a camel-owner. I find him a manly, intelligent fellow, and doubt not we shall get on well together. It was benumbingly cold, and shortly after dawn, "We must get off," said he, "for

I cannot feel the camel string." Down we squatted, and he and the Khosa horsemen had a fire lighted in no time, which I enjoyed as well as they—the camel meanwhile being tied, so that he might feed on an adjoining bush.

"Sun," I find, means any salt lake; and this episode occurred by the edge of the Oorud ka Sun, about eight miles on the way, near Somaree Khoee, above alluded to. We passed two others, where we again had a warming. Notwithstanding the cold, my Khosa guide kept chanting snatches of a song to beguile the way, like a free-and-easy cavalier of olden time. The last sand ridge forming the barrier of the Thurr is called Doho, or Drobara. We descended this at 10 A.M., and found the low, flat country of Sind spread out before us without a break on its level horizon, save a tree or two here and there higher than the bushes scattered thickly over the plain.

To my surprise I found a broad opening for a roadway, cut through this up to the very verge of the sand barrier, and continuing all the way onward. A mile or so off we reached a hamlet, once worthy the name of a village, called Suyudka Got. The Suyuds came out—they seemed plain-speaking men, civil without cringing. They were ruined, they said, from the stoppage of water since the time of the Meers, when they were flourishing fields, where now there was only jungle. I perceived traces of water-courses, and wondered to see artificial irrigation brought thus far from the parent stream of the Indus.

Wunga Bazar is two kos from the sand hills, built on a dry river bed, called the Pooran, filled with vegetable crops, but no water; I took it for a broad canal, but the Kotwál informs me it is a natural river bed. A comfortable roomy travellers' halting-house has here been built of mud, and flat roofed, but substantial, with an ingeniously-constructed fire-place, out-house, and walled courts. Very creditable this and the roadway to the Sind authorities generally, or Hydrabad Collector especially,—who would have expected to find traces of civilization thus soon reaching to this Ultima Thull? But here they also complain of want of water since the British rule began.

From what my camel-drivers (and others) told me, the custom of selling their daughters is universal amongst the Sodas. One was worth several camels, and even a poor man must raise a camel or two for a Soda wife. He greatly blamed the custom, "But you see," said he, "we are no better than animals,—who else would live in such a land? You don't call this country,—'tis only sand." I did not see tokens of

more than half-a-dozen grain fields throughout my morning's ride, or rather the daylight portion of it. But the rat-holes were as numerous as ever: the whole surface of the country is pierced like a sieve. After witnessing this, I can now fully understand the invasion of Kattywar some seventy years ago, that has created an era called, The Rat Year, "Oondriya no Sal;" when, as is related, nothing could stop the host of rats, fire and trenches being alike extinguished and filled up, and a famine produced by the ravages of the countless survivors.

Mansingjee informs me that the proprietary rights of the Thurr were thus divided:—

The Deepla Kardarut, one-half Sodas; the other half Nasrees and Raormas: both Magsleman Tribes, in nearly equal proportions.

The Mitree and Parker Kardaruts all Sodas. The Kotwal here tells me that the Pooran is only not filled with water, because of accumulation of mud; that Rs. 8,000 would clear it, and with Rs. 2,000 a second year, leave but trifling expense for future years. That he cannot calculate the proceeds accruing to Government, viz. one-third of the crops, but that they must be many thousands; this seems strange if true. This village contains about eighty huts, flat-roofed mud cells chiefly.

has been kept with strict attention, shows that the thermometer at the hottest time of the year never indicates a high temperature, except when a westerly or hot wind blows. Happily these are infrequent, the prevailing breezes being east and north-easterly. The Arabs consider the months of May, June, and July to be healthy (which I found to be the case), but immediately the dates are plucked from off the trees, fever commences. A practical illustration of the latter statement also, both as regards myself and servants, unhappily convinced me of its truth, and the repeated applications for quinine from the town's people demonstrated the prevalence of the malady. Rain, during the summer, seldom falls; but its absence is compensated for by the extremely heavy dews at night, and the frequent fogs, dense mists, and humid atmosphere during the greater part of the day. I observed the latter commenced about the beginning of August, or just as the dates were being gathered, which may probably account for the wild native idea attributing the presence of fever to the act of plucking the fruit.

Meteorological Register for the Month of June on the North Eastern Coast of Arabia, 1861.

Days of the Month.	Moon's Phases.	Temperature in the shade and depression of Moist Bulb.												Aneroid Barometer at Noon.	Rain.	Wind.		Seeb { Latitude 23° 41′ N. Longitude 58° 15′ E.
		Sunrise.			Noon.			Sunset.			9 P.M.					Direction.	Force.	Appearance of Atmosphere, &c.
		Dry bulb.	Wet bulb.	Difference.	Dry bulb.	Wet bulb.	Difference.	Dry bulb.	Wet bulb.	Difference.	Wet.	Dry.	Difference.					
		°	°	°	° ′	° ′	°	°	°	°	° ′	°	° ′	inch.				
15		96	75	21	99·30	74·30	5	93	83	10	82·30	93	10·30	29·78	None.	N.Wly.	1	Dry hot wind, cirri, Ther. at noon in sun 110°, wet bulb 76°.
16	☽	90	82	8	98·30	71·30	7	96·30	78	8·30	75	93	18	·76	,,	W.	1	Dry hot wind, cirro cumulus, heavy dew at night.
17		87	77	10	97	79·30	17·30	96·30	81	5·30	82·30	92·30	10	·70	,,	W.	2	Ditto do.
18		86	81	5	91·30	86·30	5	89	84	5	83	89	6	·70	,,	E.	1	Cirri, heavy dew, P.M. clear.
19	☿	86	81·30	4·30	89·30	83	6·30	89	81	8	81	88	7	·76	,,	,,	2	Ditto.
20		85	80	5	90	83	6	88	82	6	82	88·30	6·30	·75	,,	,,	1	Cumulostratus.
21		86	80	6	91	84	7	89	83	6	83	89	6	·68	,,	,,	1	Ditto.
22	○	88	83	5	92	85	7	91	84	7	84	90	6	·66	,,	,,	2	Cirri, dew.
23		89	84	5	92	86	6	90	84	6	84	90	6	·68	,,	,,	2	Do. heavy dew.
24		85	82·30	2·30	91	85	7	89	83	6	84	89	5	·74	,,	NE.	3	Do.
25		87	83	4	90	83	7	87	83	4	83	89	6	·78	,,	,,	3	Do.
26		87	81·30	5·30	88	82	6	87	81·30	6·30	82	86	4	·74	,,	E.	2	Cirrostrati, dew.
27		84	80·30	2·30	90	83	7	87	83	4	83	87	4	·74	,,	,,	2	Ditto.
28		85	80	5	89·30	83	6·30	85·30	81	4·30	82	85	3	·72	,,	,,	2	Cirrocumulus, dew.
29		83	80	3	88	82	6	86	81	5	82	85·30	3·30	·74	,,	,,	2	Ditto P.M. clear, heavy dew.
30	☾	83·30	80·30	3	89	84	5	89	83	6	83	89	6	·74	,,	,,	2	Cirri, Do.

Meteorological Register for the Month of July.—Seeb, N.E. Coast of Arabia, 1861.

Days of the Month.	Moon's Phases.	Temperature in the shade and depression of Moist Bulb.												Aneroid Barometer at Noon.	Rain.	Wind.		Seeb. { Lat. 23° 41′ N. Long. 58° 15′ E.
		Sunrise.			Noon.			Sunset.			9 P.M.					Direction.	Force.	Appearance of Atmosphere.
		Dry bulb.	Wet bulb.	Difference.	Dry bulb.	Wet bulb.	Difference.	Dry bulb.	Wet bulb.	Difference.	Dry bulb.	Wet bulb.	Difference.					
		°	°	°	°	°	°	°	°	°	°	°	°	inch.				
1	A	87	84	3	93	85	8	95	83	12	94	82	12	29·72	N. ne.	N. E.	2	Cirri, heat very oppressive.
2		93	79	14	98·30	83·30	15	96	81	15	96	83	13	·72	,,	W.	1	Do. observed a large comet bearing N. 28° E. near Polar Star.
3		95	79	16	98·30	83	5·30	100	80	20	99	83	16	·72	,,	,,	2	Cirri, from 10 P.M. to 2 A.M. very strong westerly breezes with parching atmosphere.
4		95	78	17	98·30	85	13·30	100	80	20	99	80	19	·71	,,	,,	4	Clear.
5		97	78	19	102	83	19	97	84	13	100	82	18	·74	,,	S. W.	2	Do. hot wind.
6		98	80·30	7·30	102	85	17	102	83	19	100	83	17	·74	,,	,,	4	Cirri, very hot at night.
7	●	98	81	7	102	85	17	100·30	84·30	16	100	82	18	·70	,,	,,	4	Do.
8		97	81·30	5·30	101	84	17	98	88	10	96	88	8	·70	,,	,,	2	Do.
9		94·30	82	2·30	97	88	9	98	84	14	97	82	15	·70	,,	,,	2	Cirrocumuli, dew at night.
10		95·30	79·30	16	100	85	15	95	88	7	95	88	7	·68	,,	E.	2	Do. do. do.
11		92·30	87	5·30	89	84	5	88	83	5	88·30	83·30	5	·68	,,	,,	3	Do. very cool at night.
12		83·30	80	3·30	87·30	82	5·30	87·30	81·30	6	85	81	4	·70	,,	,,	2	Do. heavy dew.
13		84·30	81	3·30	87	82	5	89	80	9	88	79	9	·70	,,	,,	2	Do. do.
14	☽	85	81	4	87	83	4	85	81	4	86	80·30	5.30	·68	,,	,,	4	Cumuli, agreeable weather.
15		83·30	80	3·30	89·30	82·30	7	83·30	80	3·30	85	80	5	·70	,,	,,	4	Do. do.
16	P	86	81	5	89·30	81·30	8	87	80	7	87·30	81	6·30	·70	,,	,,	3	Do. do.
17		84·30	80·30	4	87·30	83·30	4	89	82	7	88·30	82·30	6	·66	,,	,,	2	Do. do. heavy dew.
18		85	83	2	89·30	84	5·30	89	82	7	89	82	7	·66	,,	,,	1	Do. do. do.

Meteorological Register for part of July and August.—Burka, N.E. Coast of Arabia, 1861.

Days of the Month.	Moon's Phases.	Temperature in the shade and depression of Moist Bulb — Sunrise. Dry bulb.	Sunrise. Wet bulb.	Sunrise. Diffence.	Noon. Dry bulb.	Noon. Wet bulb.	Noon. Difference.	Sunset. Dry bulb.	Sunset. Wet bulb.	Sunset. Difference.	9 P.M. Dry bulb.	9 P.M. Wet bulb.	9 P.M. Difference.	Aneroid Barometer at Noon.	Rain.	Wind. Direction.	Wind. Force.	Burka. Lat. 23° 44′ N. Long. 57° 55′ E. — Appearance of Atmosphere.
		°	°	°	°	° ′	° ′	°	°	°	° ′	°	° ′	inch.				
19		86	84	2	89	85·30	3·30	88	84	4	88·30	83	5·30	29·66	None.	E.	2	Cumuli, heavy dew.
20		86·30	84	2·30	87	85	2	86	82·30	3·30	85·30	83·30	2	·60	,,	N.E.	3	Do. do.
21	☉	84	82	2	85	83	2	84	82·30	1·30	83·30	82·30	1	·66	,,	E.	3	Do. do.
22		83	80·30	3·30	83·30	80·30	3	84·30	82	2·30	83·30	81·30	2	·68	slight	,,	3	Do. do.
23		83	81	2	84	82·30	1·30	84	82·30	1·30	84·30	83	1·30	·68	None.	,,	2	Do. do.
24		83·30	82	1·30	87	83	4	84·30	82·30	2	84 30	83	1·30	·66	,,	,,	2	Cirri do.
25		83·30	82·30	1	86	84	2	85	83	2	84	82·30	1·30	·72	,,	,,	2	Cumuli and nimbi, heavy dew.
26		83	82	1	85	83	2	84·30	81	3·30	84·30	80	4.30	·74	,,	N. E.	2	Do. do.
27		83	80	3	87·30	81	6·30	87·30	81	6·30	88	81	7	·71	,,	E.	2	Do. do.
28		85·30	83·30	2	85	83	2	84·30	83	1·30	84	83	1	·70	,,	,,	4	Do. do.
29	☾ A	83·30	82	1·30	85	82·30	2·30	84·30	82	2·30	84	82	2	·73	,,	,,	3	Do. do.
30		84	83	1	85	83	2	85·30	83·30	2	86	84	2	·72	,,	,,	2	Cirri
31		84	83	1	86	85	1	90·30	74	6·30	92·30	76·30	6	·70	,,	N.W.	1	Do. hot wind.
Aug.																		
1		86	72	14	90·30	86	4·30	92	88·30	3·30	92	88	4	·70	,,	,,	2	Do.
2		86	81	5	89·30	88	1·30	89	87	2	88·30	86 30	2	·72	,,	E.	2	Cumuli, dew at night.
3		87	85·30	2.30	87	84·30	2·30	86·30	83	3·30	87	83·30	3·30	·74	,,	,,	3	Do. do.
4		85·30	82	3.30	85·30	82·30	3	85·30	83	2·30	85·30	83	2·30	·78	,,	,,	2	Do. do.
5		86	83	3	86	84	2	87·30	84	3·30	87	84	3	·76	,,	,,	2	Cirri, heavy dew, at Sohar.
6	●	86	83·30	2.30	86·30	84	2·30	86·30	83·30	3	86	83	3	·80	,,	,,	2	Cumuli do.
7		87	82	5	86	83	3	86	83	3	85·30	83	2·30	·80	,,	,,	3	Do. do.

Meteorological Register for part of July and August.—Burka, N.E. Coast of Arabia, 1861.

Days of the Month.	Moon's Phases.	Temperature in the shade and depression of Moist Bulb. — Sunrise. Dry bulb.	Sunrise. Wet bulb.	Sunrise. Difference.	Noon. Dry bulb.	Noon. Wet bulb.	Noon. Difference.	Sunset. Dry bulb.	Sunset. Wet bulb.	Sunset. Difference.	9 P.M. Dry bulb.	9 P.M. Wet bulb.	9 P.M. Difference.	Aneroid Barometer at Noon.	Rain.	Wind. Direction.	Wind. Force.	Burka. { Lat. 30° 44′ N. long. 57° 55′ E. — Appearance of Atmosphere.
		° ′	° ′	°	°	°	°	°	° ′	° ′	° ′	°	° ′	inch.				
8		85·30	81·30	4	86	82	4	86	82·30	3·30	85·30	83	2·30	·80	None	E.	3	Cumuli } Sohar { Lat. 24°22′N.
9	P	85·30	81·30	4	86·30	82·30	4	86	82	4	85·30	82	3·30	·80	,,	,,	3	Do. } Sohar { Long56°58E.
10		86·30	81·30	5	86	81	5	84·30	80·30	4	84	80	4	·80	,,	,,	3	Do.
11		83	79·30	3·30	84·30	80·30	4	85	81	4	85	81	4	·84	,,	,,	3	Cirri.
12		83·30	80	3·30	85	80·30	4·30	86	83·30	3·30	87	85	2	·84	,,	,,	2	Do. heavy dew.
13	☽	84	80	4	87	83	4	84	81	3	83	81	2	·78	,,	,,	2	Do. at Burka.
14		84	81·30	2·30	87·30	81·30	6	84·30	82	2·30	84	82	2	·70	,,	,,	2	Do.
15		84·30	81	3·30	86·30	81	5·30	85	81·30	3·30	84·30	81·30	3	·72	,,	,,	2	Cirri, very heavy dew.
16		84	81·30	2·30	87	81·30	5 30	84·30	81	3·30	85	81	4	·74	,,	,,	2	Do. do.
17		84	80·30	3·30	85 30	82	3·30	84·30	80·30	4	85·30	80·30	5	·74	,,	,,	2	Do. do.
18		83·30	80	3·30	85	81·30	3·30	85	81	4	84	82	2	·72	,,	,,	2	Do.
19		83.30	80·30	3	85·30	81·30	4	84·30	82	2·30	84	82	2	·70	,,	,,	2	Cumuli and nimbi.
20		83	80	3	85	81·30	3·30	84	80	4	84	80	4	·70	,,	,,	2	Ditto.
21	○	83·30	78·30	5	85	78·30	6·30	84·30	79	5·30	84	80	4	·70	,,	,,	2	Cirri.
22		83	78	5	84·30	78	6 30	84	80	4	84	80	4	·72	,,	,,	2	Do.
23		84	80	4	85	81	4	84	80·30	4·30	85	80	5	·74	,,	,,	2	Do.
24		83·30	80·30	3	85·30	82	3·30	84	81	3	85	81	4	·74	,,	,,	2	Do.

Abstract of Meteorological Registers.

MEAN TEMPERATURE *at* SEEB, *from* 15*th to* 30*th June* 1861.		MEAN TEMPERATURE *at* SEEB, *from* 1*st to* 18*th July* 1861.	
Mean temperature (by Fahrenheit Thermometer).	90° 04′		92° 46′
Mean depression of wet bulb	89 19		80 02
Mean of difference	6 27		11 00
Mean of Aneriod Barometer at noon	29 in. 72		29 in. 70
Maximum of temperature	99° 30′		102° 00′
Minimum ditto	83 00		83 30
Extreme depression of moist bulb	71 30		78 00

BURKA, *from* 19*th July to* 4*th August.*		SOHAR, *from* 5*th to* 12*th August.*		BURKA, *from* 13*th to* 24*th Aug.* 1861.	
Mean temperature	85° 49′		86° 05′		84° 54′
Mean depression of wet bulb	79 45		82 13		78 39
Mean of difference	2 52		3 30		3 49
Mean of Barometer at noon	29 in. 70		29 in. 80		29 in. 72
Maximum of temperature	92° 30′		87° 30′		87° 30′
Minimum ditto	83 00		83 00		83 00
Extreme depression of wet bulb.	72 00		79 30		78 00

(True Copies) (Signed) W. M. PENGELLEY,
British Agent, Muscat.

A. KINLOCH FORBES,
Acting Secretary to Government.

Art. VII.—*Memoir on Bahreyn.* By Lieutenant R. W. Whish, H.M.I.N.

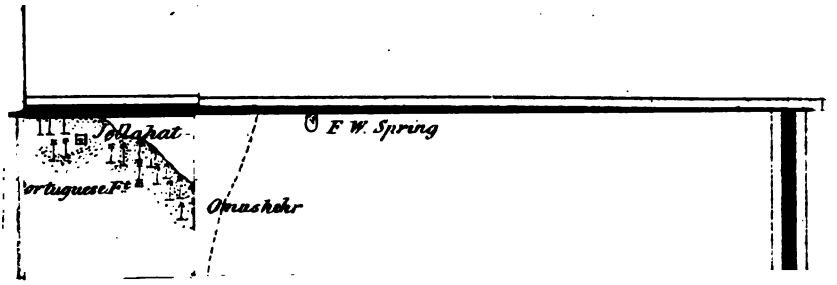
[Read before the Society, November 21st, 1861.]

In presenting the accompanying copy of a "Survey of Bahreyn Harbour, and the Khaur-el-Bab," it would seem advisable to describe the circumstances under which it was conducted, with a view of accounting for its apparent incompleteness and unfinished state.

I would therefore bring to notice that it was conducted whilst stationed in H.M's. Steamer *Mahi*, I.N., to cruize between Bahreyn and Demam, to watch the movements of the Chiefs of those places ; and to report any acts of aggression on either side. In carrying out this duty I had an opportunity of examining a channel called the Khaur-el-Bab, between the Fasht-el-Yarrom and the Khaur-fasht, as also of testing the correctness of the present chart of Bahreyn, as supplied to the vessels on the station.

This channel, the Khaur-el-Bab, it would appear from Lieutenant Constable's report, published in 1856, was known to the surveyors of the Gulf, as also to the officers of the squadron some years since ; but no record of it appears, nor is it recognised, or exhibited in the existing chart of Bahreyn Harbour ; the Fasht-el-Yarrom being made to connect with the shore "dry at low water."

The passage through the Khaur-el-Bab, now proved to be available for navigation from the fact of H.M.'s Steamer *Semiramis*, I.N., with the vessels of the Persian Gulf Squadron in tow, having passed through in 1859, had been, as yet, withheld from the use of the Government vessels, I understand, by the jealousy of the Sheykh of Bahreyn, who had directed the pilots to report it unsafe and impracticable. It is of considerable importance, however, lying as it does, in a direct line between Bahreyn and Katiff, between which places there is constant traffic ; and it is available in all weathers, and at all seasons of the year. I have beat through against strong north winds under reduced sail in H.M.'s


Muscat
F W. Spring
Portuguese Ft
Omaskehr

H.M. Ship *Mahi*, I.N., and any sloop of war could do the same. It is moreover a saving of twenty miles upon the usual route round the head of the Yarrom ; the latter being forty-five miles from Bahreyn to Katiff, and the former twenty-five miles from anchorage to anchorage, with the advantage of smooth water. To render the passage to Demam complete, however, a dangerous reef, lying to the westward of the Khaur-fasht, called the Chaschús, apparently *steep to*, should be examined and defined, as also the Neywah on the northern side of the passage.

When in tow of the *Semiramis* in the *Mahi*, as above, we passed in one cast from 2¼ fms. to 7½ fms., this was on the northern edge of the Chaschús reef. The coast line, &c. from Demam to Tanhora, is far from correct, but I regret to say I am not in a position to furnish any amended plan of it from want of means. A place over which I was directed to keep a surveillance, called Sennabis, of the Boo-Felassur, is not shown in the "Chart of El Katiff," and is situated, when properly projected, on a reef shown as covered at high water. Lieutenant Constable in his memoir apologises for this plan of "El Katiff." These remarks have been simply advanced from the fact of its connection with the Khaur-el-Bab, as also that of its being far the most troublesome portion of the Gulf; continually demanding the presence of a vessel of the squadron to ensure order, and prevent disturbance.

Whilst pursuing the examination of the Khaur-el-Bab, I took the opportunity, as it presented itself, of testing the correctness of the Chart of Bahreyn Harbour, at present in use ; and I found that, although it was sufficient to give some idea of the place, it was considerably out in detail.

The chart now presented is constructed on the plane scale, one inch to 2,000 yards, and has been plotted with every possible attention to accuracy. In addition to the soundings in the harbour, I have been able to furnish some idea of the country inland, the result of a trip that I made to Ruffar, and Jibbul Dukhan, the most elevated ground on the island of Bahreyn, on the summit of which I have erected a pyramid at the site of my station.

Altogether, the chart professes to be little more than a guide to a more minute and perfect survey on some future occasion, and it is as such, alone, that I venture to lay it before the public.

By a carefully-measured base, the true bearing of the Sheykh's house, at Manama (through which I have drawn the True meridian) from the highest pinnacle of the Jellahat al Bahreyn, or Portuguese

fort, was found to be S. 88° 02′ 30″, E. distant 5,902 yards. The natives call this fort by several names,—Jellahat al Feringi, Jellahat Jibbleca, and Jellahat al Bahreyn, being the site of the ancient town, when Manama was only a fishing village. There is no record of the age of this fort, but it is very ancient and extensive, and there are characters in relief on the outside of some of the Bastions. On inspection, however, we found that these were of late date, probably stones originally belonging to some other building, used to repair the fort, as the characters appeared to be Arabic. In the centre of the fort, is a deep and well-built well, with only a little brackish water at the bottom, and the natives say that there is, or was, at one time, an underground communication between the fort and Gasseyr (light-house rock). This rock bears evident signs of once having been the site of some building, but the water is very shoal in its vicinity, nor could I trace anything to justify the appellation of the Portuguese Harbour.

Close to the eastward of the fort is the village of Karbabad, and between this and Manama, are the villages of Sennabis and Naim.

The configuration of the island to the southward, as exhibited in the printed chart, I take to be a mere conjecture ; and I was told that any vessel could sail round the island, where she would find in some places as much as 60 fms. water, and if so, by far the deepest portion of the Gulf.

The armed pinnace of the *Falkland*, when stationed there, made the circuit of the island as guard-boat, but no report was made of the capacity of the channels.

Sheykh Ali Bin Khalifa told me he would undertake to conduct the *Semiramis* round the island, and, I believe, it was once contemplated by her commander, although circumstances prevented it being carried into effect.

The road from Manama to Jibbul Dukhan leads through rich date plantations and gardens, in the direction of the Minarets, passing by which, you cross a backwater more or less fordable according to time of tide, and after proceeding about half a mile further through date gardens you emerge upon an open space, at first consisting of tumuli or mounds (probably the site of a large village or town), but gradually subsiding to a level plain, in some places swampy, till you come to a change in the character of the island. Ascending by a rocky path between steep cliffs 40 or 50 feet high, you now find yourself upon elevated ground, barren, and so stony, that none but the horses of the

country could be expected to proceed. The road continues in a gradual ascent till you arrive at the fort of Ruffar. Here, descending again into a vast crater surrounded on all sides by cliffs, the road leads for five miles over uneven ground of rocky formation to Jibbul Dookhan or Dukhan, a mass of rock standing almost alone in the centre of the crater. The surface of the soil between Ruffar and Jibbul Dukhan is strewed in some places with round stones, very much like what I have heard called " potato-stone" from its similarity to that vegetable. On breaking these, I found them hollow, having their concave side covered with beautiful crystallized spar. The outside being coated with a kind of lichen, gave the ground at a distance quite a green appearance. I am extremely sorry that I did not bring away some specimens, as I think they would have proved of geological interest. From the summit of Jibbul Dukhan I could discern nothing in the direction of Ras-el-Bhur (or the Land's End) but a barren sandy plain, with a frontage of cliffy land between it and the sea; but I was told that the island of Zuknoniyyeh (Zucnone of the chart) to the S.W$^{d.}$ is visible on a clear day. I was enabled from this station and Ruffar to fix the villages of Zellag and Mahamir, and thus determine the breadth of the island between those places. There are some inferior elevations between Jibbul Dukhan and Ruffar, but I was unable, from want of means, to ascertain any heights above the sea level. Jibbul Dukhan is visible some distance off the port, and is a good mark for entering the harbour.

Ruffar is the sanitarium of Bahreyn, and is reported to be extremely healthy. In the village of Heneniyyeh, in the plain beneath the fort, is a very deep well, the water of which is considered to be the best on the island. It differs from that of Manama; the latter, the natives say, is light, whilst the former is heavy—terms either synonymous with hard and soft, or serving to express the different specific gravity. The younger portion of the Sheykh's families live at Ruffar where they are put to school, and learn military exercises, and, as we were informed, are kept out of mischief.

The fresh water springs in the vicinity of the island, from which it would appear to have been called (" Bahreyn," sea-springs), are worthy of notice; they are for the most part below the level of the sea, and are situated on the reefs fronting the shore, whilst some are always submerged.

At Saiyhee, a small rocky islet to the westward of Psetcen village, there is a spring of fresh water which bubbles up into a basin in its

centre; at high water, during the prevalence of a N.W^r. the sea washes into the basin or reservoir and taints it; but at other times, the water thus collected, is perfectly fresh. Proceeding to the north-east we come to two springs, on the reef between the Islet of Khasaefi and the shore: these are only exposed at low water; further east again, are two more throwing jets through the rocky reef extending off the village of Galláli, called Kashásh, once protected by a tower or fort built on the reef, and called Yredi. Fresh water springs were also reported on Boo-Shaheen Islet, to the southward of this, but I had not opportunity of visiting them.

Near Maharrag fort is a spring with the walls of a fort or guard-house, still standing, close to it. It is called Boo-mahur; and the water, which is quite warm, is obtained by means of a bamboo with a hose attached to it. This spring is always covered at all times of tide.

There is another spring on the Khaur-fasht, having three feet over it at low water spring-tides, from which I obtained seven hundred (700) gallons of water in one day to fill up the vessel under my command.

Having procured a búm or boom (a large flat-bottomed boat for cargo), with a large wooden tank in it, at Bahreyn, I proceeded in the *Mahi* with it in tow to the Khaur-fasht, where I anchored within five hundred yards of the spring. I next got a large copper funnel, and after securing a pump hose to the neck of it, I placed it, inverted, over the spring, and blocked up all other means of escape with swabs. By this means the water was forced up through the hose into new canvas bags, with which I filled the tank in the búm. I tried also a spirit pump shipped on to the neck of the funnel, which answered extremely well, till the tide rising obliged me to have recourse to the former expedient. The water I procured was perfectly fresh, and all pronounced it to be far better than that supplied to the vessel at Bahreyn.

This spring is situated 6¼ or 6·25 miles from the nearest land. Portuguese fort and Marwaddi, dry sand in one, form a transit over the position of the spring, as also centre of Jibbul Dukhan on with a pyramidal tope of trees (which I called "transit tree"), but it is very difficult to find at high water if the sea surface is troubled at all.

I was told the following story in explanation of the numerous fresh water springs on and around the Island of Bahreyn. My informant commenced by telling me, that there were, at one time, no less than six hundred and sixty-six villages or towns on the island—and then proceeded to account for the springs as follows:—

"Once upon a time there was only one spring on the Island, which was situated not far from the present site of the Minarets; that a beseiging army coming up from the S.W. proposed, previous to attacking the place with arms, to block up the spring, and thus cut off the supply of water from the inhabitants. In this they had hardly succeeded, when the water burst out in all the other springs now known, on and about the Island; and they point out a Musjid built, as they say, on the mound formed by the filling up of the original spring."

I landed several times on the Fasht-el-Yarrom to erect a flag as a mark for sounding the channel, and placed it on a rocky patch which was supposed by officers, who have previously reported its existence, to be the remains of a fort; but I could see no traces of anything like a building, although the natives say, that there was not only a fort, but that two (2) date trees grew there at one time; and they affirm that there is also a fresh-water spring in the vicinity. It is known by the name of Jellahat-el-Yarrom, and bears from the Portuguese Fort, N. 9°, W. 12° (true, i.e. not magnetic), distant 23,283 yards. The nearest approach to it is under Ras-el-S'lah, forming the northern side of the western entrance to the Khaur-el-Bab. Before leaving the station, I built a pyramid on the rocky patch, six feet above the level of high water mark.

I was unable to find any mark for entering the Khaur-el-Bab from the S.E., the pilot in beating from Bahreyn, invariably beat past the entrance—looking out for the Portuguese Fort coming in transit with Jibbul Dukhan, the vessel being then on the edge of the Yarrom: he then bore up about south, and rounded, what he called, the Jah'doom, being guided, as far as I could see, entirely by the soundings.

The ground north of the Portuguese Fort is very foul, with overfalls, and the pilots never borrow on that side of the harbour on that account: they call it all Leyah, from the rocky patch that is dry at low water, of that name.

As I have been in and out of Bahreyn Harbour several times, I feel authorised, from my experience, to make the following remarks:—Pseteen High Tree in transit with the western extreme of Jibbul Dukhan, or Gallali Tower south (or on with a clump of date trees to the south called Zimmee), appears to clear all dangers to the eastward of the Yarrom. This edge, as reported by Lieut. Constable, is very badly defined, and is dangerous in making the Port in thick weather, as it is almost out of sight of land.

The angle subtended by two objects, set on a sextant, is, though very seldom employed, frequently of more value in keeping a vessel out of danger, than hand-bearings; and thus Gallali Tower and Pseteen High Tree subtending an angle of 25°, seems to clear all foul ground off Semahi (or Arad Bluff) with this angle on, and Pseteen Tree south, you may steer S.W. by W. till Jibbul Dukhan comes on with the Minarets, when steer so as to keep them in one (or nearly south) till Saiyhee Islet comes on with Pseteen High Tree, then steer S. by E., looking out for the extreme of the rocky reef called Zirwán, which forms the northern boundary of the inner anchorage, till Saiyhee is seen opening out from Deyah Bluff (or the N.W. extreme of Maharrag Island), when haul in S.E. for the Sheykh's house at Manama, and anchor in from 3 to 2½ fms. low water spring tides, as convenient. This is only applicable to vessels of light draught; heavier vessels would, obviously, have to remain outside Ras Zirwán, in the outer anchorage.

Bahreyn Harbour is a most difficult place to make in hazy weather, as the land being quite low, nothing is seen of it till shoal soundings are obtained, which are useless as a guide to the ship's position. The tide, too, runs strong off the mouth of the harbour about east and west.

These things considered, it seems best to make the harbour open from the N.E., and to that end, in coming from Bushire, to keep on the Persian Coast till abreast the Mutaáf (or Berdistan bank), and then stretch over to the Arab side. By this means you avoid a rocky patch with 3 fms. on it lying 50 miles north of Bahreyn in the direct line to Bushire, and make the harbour with the reefs equidistant on both sides.

The currents in the centre of the Gulf are very uncertain in direction, and strong at times. On one occasion in H. M.'s Steamer *Semiramis*, I. N., we were steering from Bushire direct to Bahreyn, and made the head of the Fasht-el-Yarrom several miles to the westward of the direct line. I attribute this deviation from the course entirely to a strong N.W$^{ly.}$ set or current. This would be a most dangerous place to ground on, miles away from any assistance, and exposed to the whole fury of a N.W$^{r.}$

A survey of the Island of Bahreyn, and Dohat Selwah to the south, would be interesting; and as the present delineation of the Island and coast has been acknowledged to be little more than an "eye sketch," it would present almost a new field to those engaged in it. I doubt very much whether the inhabitants of that part of the Gulf would be found

very friendly, and should certainly suggest that the vessel so employed should either be fully equipped for service, or accompanied by a man-of-war.

Regretting that I am unable to give any statistical account of Bahreyn and its inhabitants, social, and political economy, &c., and trusting that the object of my feeble attempt to advance the cause of general, not to say scientific, information in the foregoing description may be appreciated with every apology for its shortcomings.

ART. VIII.—*Report on the Rise, Progress, and Results of the late Flood or Overflow of the Indus, which endangered the Towns of Shirkarpoor and Jacobabad.* Presented by J. D. INVERARITY, Esq., C.S., Commissioner in Sind.

[Read before the Society, December 19th, 1861.]

No. 367 of 1861.

REVENUE DEPARTMENT.

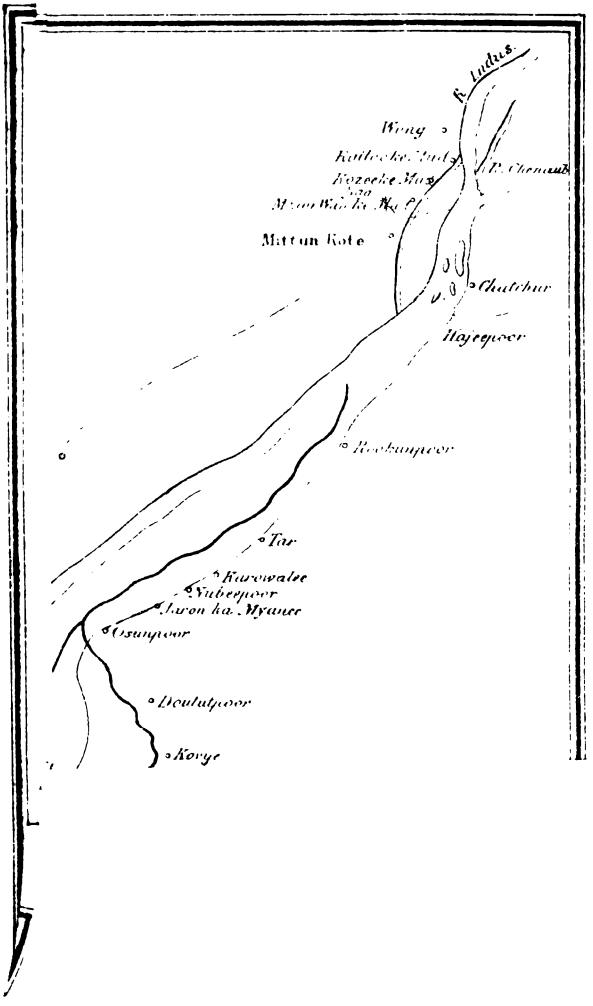
REPORT of the Collector of Shikarpoor regarding the present Flood in the northern portion of the Collectorate called for in the Commissioner's Memorandum, No. 919, dated 9th September 1861.

1. The Indus has not this year attained a level of more than 9 inches above that of the inundation of 1860. The greatest rise has been 12′ 9″ at the Bukkur Gauge, but this does not show the total rise above low-water about 4 feet more.

2. The *set* of the stream however has, during the whole of the season, from Kusmore down to Bukkur, been on to the right bank; and a far greater volume of water than usual has, in consequence, been poured down all the feeding canals, so much so indeed, that the Zemindars inform me that the "moke" or natural overflow has this year been greater than they have known it for many years.

3. Two flood streams burst over the country from the Indus. The first from above Kusmore flowed about 29th July, and after flooding vast tracts in the Jacobabad Districts north of the Bigaree Canal, burst the spoil banks of that large feeder, and passed on south into the Shikarpoor Talooka, meeting the second flood stream from a place called "Moramaree," close to the mouth of, and north of the Sind Canal. This second stream commenced flowing on 9th August.

4. The two streams combined, forming a volume of water (5) five miles in width, and varying from 3 to 5 feet in depth, then swept across the country in a south-south-easterly direction.



R. Indus.
Wong
Kozeeke Mus
Mittun Kote
Chatchur
Hajeepoor
Tar
Karowalee
Nubeepoor
Jaron ka Myanee
Osunpoor
Doulatpoor
Kovye

This is a considerable town recently obtained by the Darbar from Jareja Somrajee, about which transaction so fierce a battle has been waged. The Rao has built two Martello towers, &c.: the old bastions and walls were mostly thrown down by, the earthquake of A.D. 1819, the debris still lying about: two small lakes close to the town, separated from each other by the roadway embankment, with some good-sized trees, give the place a cheerful appearance, the more enjoyable after the desolate country travelled through.

Tera, Thursday, 13th November.—Halted here for the interview with Jareja Somrajee and Bhayad. A tedious repetition of arguments and reasoning, something like speaking to a rock and getting back echoes.

Badra, Friday, 14th November.—After all the reports of the fierce tusker, disappointed at finding nothing but small game: however 'tis a consolation that the ground is bad—full of deep nullas, and ravines, and standing kirbee. Distances—

	Miles.	Fur.	Yards.
Tera to Chupree River	2	3	0
Bhalapoor, a ruined hamlet	8	2	0
A S. bank of the Badra River.			
Badra on North bank	0	6	80
Total	11	3	80

Thermometer at 5 A.M., 76°! 3½ P.M. 91°. Aneroid continues falling between 6 and 7 A.M.; a sharp thunderstorm to northward; much forked lightening; black clouds and slight rain; double rainbow.

Saturday, 15th November.—Mudh, or more commonly written as well as pronounced Murh. Thermometer on leaving Badra 6 A.M. 70° in, and 68° outside of tent: at 3½ P.M. 91°. Aneroid continues falling.

No village on the road, but a few small and one middling size tank: the last well supplied with wild duck and geese. Distances—

	Miles.	Fur.	Yards.
To Gopalwala Talao	2	5	50
Murh	4	3	5
Total	7	0	55

This place is celebrated for its Alum works—the manufactory a royalty; the village belongs to the priest of its "Mata" temple, a shrine much

honoured by the Rao. Substances are found here in the soil that burn with a scent, something like frankincense, called Bhootkana and * * * Visited, in the evening, the Alum mines with the head man, a Mahomedan, who has retained their management in his family for 5 or 6 generations: all his workmen, he tells me, are Mussulmans. The soil is excavated by narrow shafts dug at an acute angle downwards, penetrating afterwards by arched pathways, branching off with numerous ramifications into the substance of the earth, which is removed as basis of the manufacture: heaps of this soil are piled up at the mouths of the shafts. I descended by torchlight, and after winding about at the depth of about a hundred feet from the surface, for a few hundred paces hither and thither, came again into daylight at about 150 yards from the spot where I entered: the soil was soft and crumbling, yet only one fatal accident by falling in of the earth was known to have occurred, it tasted like salt mixed with ashes.

The next process is to remove this earth to the drying pans (like those of a common salt-work), where it is thrice saturated with water during nine days, the residuum cakes after drying, when it is taken up and thrown into large cauldrons and boiled together with one-fourth its quantity of saltpetre. After cooling, the substance is washed with water from a reservoir, near a temple, of brackish water, to which superstitious qualities are attributed, and then again boiled and poured into frail earthen vessels, where it is left to dry: this is the last stage of the manufacture; the pots are broken and the alum either exported in lumps or chrystals as the state of the market may require.

The workme ndig the soil, furnish the saltpetre, and manufacture the alum from first to last at their own expense, receiving two korees the maund for their labour; from forty to fifty thousand maunds are yearly made, they told me, though at present the works are at a stand still, owing to the difficulty of finding a market at remunerating rates. The whole of the manufacture is a royalty, and the sale managed by the Rao, who keeps a couple of horsemen and a dozen footmen at the place to watch and assist: only a portion of the saltpetre required is produced here, the rest comes from other quarters: the mines have been worked, they tell me, for five or six centuries.

The town contains between four and five hundred houses and has a dirty, dusty, parched up appearance: the heat in summer must, I should think, be great. The village is held in grant by a Gossaeen of the

* Left blank in original and now forgotten, the specimens are unfortunately mislaid.

No. 602 of 1861.

Public Works Department.

From

Major W. L. Merewether, C.B.,
Political Superintendent, and
Commandant in the Frontier District, Sind.

To

J. D. Inverarity, Esquire,
Commissioner in Sind.

Sir, *Dated 2nd November* 1861.

As requested in your Memorandum, No. 919, of the 9th September last, I have the honour to report that, the overflow from the Indus, in the Frontier District, has been greater this year than it was last, even though the rise of the river has only been an average one, and, according to the guage at Bukkur, about the same as last year.

2. In 1860, the highest rise above low water level was, on the 16th August, 12 feet 3 inches. In 1859, the highest was about the same; but in July, having gradually increased from the 1st, when it was 11 feet 8 inches; after the 16th the river began to fall, till on the 31st it was 11 feet 3 inches only. In 1861, the highest rise was, on the 3rd September, 12 feet 4 inches, having been 11 feet 6 inches on the 16th August. The water fell rapidly after attaining the maximum.

3. For some years past, the river has been eating steadily into the right bank at several points, viz. between Kusmore and Gehilpoor, Gehilpoor and Budanee, and Khaee and Gobla. Large, almost semi-circular pieces with radii of from two to three miles have been cut out. The new town of Budanee, which was laid out by me in the beginning of 1855, and then considered quite safe, has long been carried away. New Gobla, formed the following year, some distance within the old site, has also gone.

4. In all such rivers as the Indus, the beds are gradually raised by the amount of deposit, which is annually left throughout its course: the ground on the immediate banks is raised also: the distant lands retain their low level. The general course of the Indus is S.S.W. Sukkur, geographically, is far below Jacobabad, but the average fall of the country from the former to the latter is nearly five inches a mile.

5. The result of the continued and extensive erosion in one particular direction, such as is described in paragraph 3, is to penetrate through the natural bounds, formed by the raised banks, and for the water then to find an easy and unimpeded passage to the low country, even though the river has not exceeded its ordinary average height.

6. This has been the case during the past two seasons in the Frontier Districts, and caused floods, such as tradition even tells not of. These, without any artificial means of prevention being adopted, may not occur again, for it generally happens that, within the large bays, cut out by the action of the water, islands are formed which protect the main land from further encroachment, and turn the force of the river perhaps to the opposite banks, or it makes for itself a straight course by cutting away the lower portion of the semi-circle.

7. The flood began to show itself about the end of June, when the river, by the Bukkur guage, had risen above 10 feet. It filled the Sind hollow, itself an old branch of the Indus, and, overflowing its banks from Hybut and Kundkote down to Ghowspoor and Shereghur, passed steadily and quietly on its westward course, till on the 28th July it met and was checked by the Sonewah, a canal running from the Biggaree due north, having high and strong banks. The pressure, however, was so great, it soon crossed this, reached Meerpoor, six miles further west, on the 3rd August, and by the 29th of that month, had come as far as the Noorwah, only three miles to the eastward of Jacobabad. This canal also, an offshoot from the Biggaree, has a nearly northerly course, the flood came on it perpendicularly. Had the western bank given way, and if the flood had lasted much longer, it must have done so, the water would have continued its course with great force, much increased by the temporary restraint, and the cantonment and town of Jacobabad would have been in imminent peril. Extensive bunds would alone have saved it, and there would have been little time to have prepared them.

8. Fortunately, through the judicious measures adopted by Captain Briggs, Assistant Political Superintendent, who was on the spot, and was constant in attentive watching, the pressure on the western bank near Jacobabad was lessened. Openings were made on both sides of the Noorwah, where it crossed a large natural hollow to the north of Jacobabad. This lessened the water in the canal, and allowed of the flood being drained into, and down it. The mouth of the Noorwah was then closed, shutting it off from the Biggaree, and only the flood water

and water have to be brought from the town. Some dozen seamen who told me they lived there all the year round, crowded round me. Their headman, whom they called jemadar, although a Mussulman, could neither speak Gujarathee nor Hindoostanee, his language was a mixed jargon of Sindee, Kutchee, and a little Gujarathee, but some of the boatmen could speak intelligibly, and one was exceedingly intelligent .The Bundur population they said was formerly 500, but was now reduced to a score: they complained of being half-starved, and they looked it; they had no clothing to keep them warm during the cold season. Three years ago the Rao came here and fixed the toll for passengers ferried over to Sind, on which chiefly they live, but so badly as seriously to contemplate migration. The charge is a korce per head. The only place they cross to is a building called Kotree, some six miles off in a northerly direction: through the telescope it looks like an upper-roomed cottage. . Here a Brahmin resides from religious motives to bestow water on *all* travellers: the water is kept in a wooden tank and in vessels, each ferry-boat taking a small supply. The Rao pays for this as a charitable grant. From that lone and desolate cottage the Runn extends 8 kos in the Kurrachee direction, and 14 towards Hydrabad, without a vestige of life. Either distance is generally traversed by a forced march at night time; not a drop of water is to be had by the way. Camels, cattle, &c. cross the creek at low tide, and are obliged to make a circuit of 6 or 7 kos, owing to the mud, to get to Kotree, and at the best have a troublesome time of it.

They tell me that at high spring-tides there is three fathoms of water opposite Sindree, 16 kos from this, but that some intermediate spots are so shallow, that it was doubtful whether the ferry-boat or Sind Dhondee, capable of carrying 30 persons, could go through even then. These boats are flat-bottomed and draw a cubit (1½ foot) water. As is well known, Sindree was sunk by the earthquake of A.D. 1819: its bastions are still visible and left standing here and there, but the place is utterly desolate. The inhabitants effected their escape in boats. The water up there is so salt, that fish are not to be found, except a few during the monsoon.

The tide rises here 4½ feet usually, and 9 to 10 feet at the springs. At the Bundur they said there was a fathom and a half: the surface of the water was only three feet from the level of the Runn, the soil of which is here a tenacious clay: there is no sloping bank. The creek has cut its way through, leaving perpendicular sides ready, apparently, to fall in at the caprice of every tide.

One of the men stood before me on the spot some hundreds of yards away, where they informed me, only 12 years ago the creek ran with 3 fathoms water, whereas it has now dwindled down to half and formed a new channel: the level surface does not betoken any such change.

All would be saved, they said, if the Meer's Bund were thrown open, as the Indus would then force itself a clear path down as in former times.

The only sign of trade visible was a few heaps of small brick-colored stone called Geroo, a kind of ochre, obtained near this, used for dye, the Rao's duty on which is two pice per maund. A yellow stone, called Kaya, is also, they say, exported for dye to Bombay, which assumes a red color under fire, but gives a dark dye. Seven or eight Hindoos were here, returning to Sind from a pilgrimage, and waiting to be ferried across; these men and the stones were the only symptoms of traffic visible. This bunder does not admit vessels above 30 khundees, and that only at spring-tides.

The sea-port of Lukput is Koteshwar, curtailed to Kotesur, 9 kos distance, which admits vessels of a hundred khundees; but the roadstead is rocky and unsheltered. I am further informed by my people, who have just returned from that quarter, that there were only 5 or 6 vessels then lying there, and none of above sixty khundees.

Old Mookundjee, who was here 52 years ago, then a lad of seven, says he has a clear recollection of the creek being then 5 or 6 kos broad, whereas it has now shrunk to less than a mile*: high spring-tides however, would make a great difference by spreading over the level Runn.

Mookundjee says that at that time Futteh Mahomed was building the Lukput fort, and the Ameers of Sind sent word, that unless this was discontinued, they would cut off the supply of water, and thereupon commenced building the Alee Bund; Futteh Mahomed treating their threats lightly, continued his work, boasting that when this was finished, he would at any time open the Bund with a few pick-axes: the anarchy ensuing in Kutch defeated his intentions on Sind.

Spent all the afternoon with my tent filled by the best informed men of town and port, assembled for me by the karbharee before alluded to, as having been with Burnes in Sind, &c., an intelligent man, himself giving information, and helping to get it for me from others.

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* Considering his youth this must be received with caution: information otherwis collected points more to diminution in depth than in width.

the distance of 2 to 3 kos, commencing about 2 kos above Sindree: the spot is called Ullah Bund (God's embankment),* but the monsoon has worn a water-way through it in an irregular narrow channel; the material being of clay, sand, and gravel, this would soon be deepened and widened by any flow of water; the earth was also raised at a place called Sunda.* The usual tide only reaches this Sunda, the spring-tide now goes over it by a cubit, the earthquake of 1819 raised the ground so as to leave the tide there waist high, but in Sumvut 1901 (A.D. 1844) a series of shocks occurred, that raised the earth still more, so as to leave a cubit (foot and a half) as the greatest depth of water ever found there: these shocks also extended the breadth of the Ullah Bund to the extent of 3 kos: before they occurred the usual tide went over the Sunda by about half a foot, but now not at all. At spring-tides, however, a boat drawing a cubit water can with some labour be taken over the Sunda.

Pursuing the upward course of the river it is thus described:—

After passing the Sunda, a pool (Chuch) is reached called Muthar, where the water is waist high at all times; this is half a kos long: then comes the Ibrahim Shah Peer flag-station, where there is nine feet of water or more, which continues past Sindree until the Ullah Bund is reached; through this bund, as before explained, an irregular narrow shallow channel continues the stream during the monsoon: at other seasons water terminates at the Ullah Bund, so that there is only the dry bed of the old river until we reach the "Chuch," called the Bun-lrejo Duryao, some three kos higher up, where the water is waist high nd salt: it lasts for 4 kos, and is terminated by the Suyudwalla Bund bove described.

The earthquakes of 1844 here referred to I do not remember ever ading or hearing of, yet they are shown to have effected an important nge in the earth's surface: the shocks are said to have lasted during ole month (all Jeth, Sumvut 1901), and were so threatening that they lasted the inhabitants feared to sleep in their houses.

e Banians complain bitterly of the ruin entailed on them by the taxes of the new Sind Government. Before the British conquest, was a great port for the introduction of goods into Sind: now,

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l speaking at once the subject needs further inquiry. On these two points ply doubt.

besides 3½ per cent. *ad valorem* paid in Bombay on goods brought to Kutch, these same goods are again charged 10 per cent. when conveyed across, besides such interference and annoyance at the frontier as to amount to total prohibition.

One thousand houses of Banians, traders and those dependent on them, have been deserted since the Company took Sind. There were previously 250 Sindian merchants here—now not one.

The desolate appearance of the town corroborates the assertions of these men, but I suspect that Lukput has been on the wane ever since the alterations effected by Divine and human agency in the bed of the river.

N.B.—My tents were pitched under a large Wur tree in a garden south-west of town.

Thermometer on 18th at 6 A.M. 62°, both inside and out. 18th November 1851, Lukput.

ART. X.—*The Mosaic Account of the Passage of the Israelites out of Egypt, supported by the Geographical Configuration of the Country surrounding the Gulf of Suez.* By EDWIN HEYCOCK, Esq.

[Read before the Society, March 20th, 1862.]

THE subject which I am now about to bring before you, has been so frequently discussed, and has been written upon by so many travellers, that it needs some apology for my now bringing it under your notice. I venture to do so, because the views I entertain upon this subject differ from those of every one whose writings I have seen; and, provided my views are correct, it is only of late years, since the survey of the Red Sea, and especially of the Gulf of Suez, by Captain Barker, in 1848, that the solution I have arrived at could have been supported with confidence. It is nearly ten years since I undertook to study the question, and before commencing with maps, tradition, or the writings of travellers, I began with the Mosaic account, and by taking heed to this description of the travels of the Israelites out of Egypt, I was led step by step to the border of the Red Sea and to the very spot where, without seeing any chart, or knowing that Captain Barker's survey was in existence, I came to the conclusion that there must exist at that spot a bank across the sea, or that the miracle could not have been wrought as described by Moses; and the consideration which the subject has received during the past ten years, has only tended to confirm the truth of my first convictions. I will endeavour, as briefly as I can, to lay before you the reasons which led me to the conclusions which I formed.

All writers seem to be agreed that the Israelites dwelt in the north of Egypt, and Moses' description of their journey proves this to be correct, for he says "they took their journey from Succoth and encamped in Etham in the edge of the Wilderness" (Exod. xiii. 20), which places were situated to the north of the Great Desert to the east of Egypt.

From Etham Moses was instructed to turn their course into the Wilderness, until they should encamp before Pihahiroth, between Migdol and the sea, over against Baal Zephon, "before it shall ye encamp by the sea."

may come again upon the Egyptians, upon their chariots, and upon their horsemen. And Moses stretched forth his hand over the sea, and the sea returned to his strength when the morning appeared; and the Egyptians fled against it; and the Lord overthrew the Egyptians in the midst of the sea. And the waters returned, and covered the chariots, and the horsemen, and all the host of Pharaoh that came into the sea after them; there remained not so much as one of them."

Besides this account from Scripture, tradition has marked the spot, by giving names to the surrounding objects bearing upon this great event. The valley is called "Wadi Mousa," or "Valley of Moses," the neighbouring mountain is called "Jibbel Attakah," or "Mount of Deliverance." whilst the point of land jutting into the sea is called "Ras Addajah," which is a corruption of Ras Attakah, or "Point of Deliverance."

There is one further point to which I wish to direct attention, and it is this: nearly all writers upon the wanderings of the Israelites take it for granted, that as soon as they got over the sea, they were led southward toward the desert of Sinai. So far as I can trace their journey by the Mosaic account, they were led in a north-easterly direction towards the promised land. It was only when they murmured upon finding the bitter waters of Marah they were turned back. "There he made for them a statute and an ordinance, and there he proved them." And the proof was that though they had seen the entire overthrow of all the host of Pharaoh yet they had not faith in God, and were unprepared to meet the difficulties before them of driving out the Canaanites from the Promised Land. In fact they were a nation of slaves, just liberated from bondage, and it required that the whole generation should perish and a new generation of freemen be raised up to undertake wars and overcome difficulties which their pusillanimity could only murmur at and shrink from attempting to overcome, though under the direct guidance of the Almighty. I fear slavery still requires the immolation of its victims before their offspring can assert the rights and defend the privileges of freemen with fortitude and perseverance. Marah is, in different though parallel passages, said to be in the Wilderness of Etham, and also in the Wilderness of Shur. This Wilderness stretched from Egypt on the west to Palestine on the east, and in all cases when defined is spoken of in terms which place it to the north of Suez. For instance, in going from the Promised Land, the Egyptian, a maid-servant of Sarai, fled with her son into the Wilderness of Shur. Again, Shur is

described as "before Egypt as thou goest toward Assyria," which makes it in a line to the east of Egypt and north of Suez.* From Marah the Israelites appear to have been brought back to Elim, or what are now called the Wells of Moses, which still preserve with much fidelity the Mosaic account of them.

In conclusion, I would remark that it is owing to the labours of the naval officers of the Honorable East India Company's Navy that we are indebted for the means of solving a problem which has puzzled writers for many ages, and without which, though I might have correctly reasoned from data before me that a bank across the sea at Addajah Point was necessary to satisfy the conditions of the Mosaic account, I never could have proved the correctness of the conjecture without the labours of Captain Barker and his naval companions.

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* (In Numbers xxxiii.) it is said the Israelites "went three days' journey in the Wilderness of Etham and pitched in Marah." It appears that the Wilderness was called, by persons leaving Egypt, the Wilderness of Etham, after the border city of that name, and was called the Wilderness of Shur by persons leaving Palestine, because that place was situated on the border of it towards that country. In either case Marah is situate, according to the description, to the north-east of the place at which the Israelites crossed through the Red Sea.

These Wells are very ancient, but it is only within the last few years that the people of Suez have ever turned them to account. The first garden was laid out by Nicolo Costa, French Consular Agent; in his garden there is a spring sufficient to irrigate the whole garden, which is 300 yards in length and 200 yards broad. They have formed a large basin round the vicinity of the springs with ducts or canals leading in different directions, which are closed up during the night, and in the morning the basin is filled almost to overflowing, the gardener then opens out the ducts or canals where the water is required, and as these springs are in the highest part there is no necessity for raising the water. There are, besides these springs, several others which do not rise to the surface; these are formed into good wells, built up with stone. There are also several aqueducts leading in different directions, but all out of repair, and one leading from the wells to within 70 yards of the beach distant about one mile.

There are now four gardens which form, as it were, country seats. The one just mentioned, the others belong to Maalim Godsey, Mr. Livick, H. C. Packet Agent, and another to one "Georgis," a wealthy merchant at Suez. There is also a very substantial built well about $1\frac{1}{2}$ miles to the eastward of this place, which is almost filled up with rubbish, but still used by the Bedouins for their camels. The water is slightly brackish from the nature of the soil, which is deeply impregnated with salt.

We remained at the Wells till the evening of the 24th, preferring to live in the tent (as all their houses swarm with vermin), which however made us feel the heat very much. The thermometer ranging as high as 100 deg. of Fahrenheit, falling to 70 deg. during the night, owing to the very heavy dews. Quitting Moses' Wells we proceeded along the coast to southward for better anchorage, and brought up under Ras Maselia, 4 miles from the Wells, to allow our boatmen to break their fast. This being the month of Ramazan, they neither eat nor drink during the day. Observing a rude stone-building on the beach, we went to it, and found there stone-cutter's implements. The people are sent here from Suez to cut stone for the house of the P. and O. Company building there. I thought it spoke much in favour of the honesty of the people, that they should leave their tools laying about on the beach.

On a low range of sandhills, about 3 miles from the beach, there is a pillar. It was too late for us to visit it, but I must do so at some other time. At 9 o'clock P.M. we started for Aboo Deraj, where we arrived during the night.

Early in the morning of the 25th we landed at Aboo Deraj, and walked up to the Well, which is situated at the foot of a ravine: from this well our ships are supplied with water. It is merely a hole dug in the ground about 8 feet below the surface, about 5 feet in diameter, and at the time we visited it, it had about 4 feet depth of water. It rises and falls with the tide, or rather the water does. It is singular that this is not marked on the charts. It bears from Suez true S. 8 deg. W. distant 31 miles, and is about 400 yards from the beach, good ground for rolling the casks to it. The anchorage bad, deep water close to the shore, and a shelving beach. Our boat was anchored under a small patch of rocks, moored head and stern. In north-westerly winds there must be a good deal of surf here, but still more in southerly winds. Here we found a mass of ruins; one apparently had been a kind of fort (the south-western angle was formed of one large mass of sandstone), evidently been built strong and high, inside it measured 60 paces, each side being square. There was the remains of a wall to be seen which appeared to have been built so as to enclose the well, and another well, now filled up, was in the centre of the building. There was another building similar to this, and an immense heap of ruins, covering an extent of at least half a mile in diameter. At a short distance there is a small detached ruin, called by the Arab boatmen "The Church." It appears to have consisted of two rooms, an arch connecting them, part of which now remains, and along the walls are several niches about 3 feet high. The plaster is in good condition, and about ¾ of an inch thick.

The hills in the vicinity are formed principally of red sandstone, clay, slate, granite, with strata of magnesian limestone, talk and trap, and most, but more particularly, the sandstone appears to have been subject to the action of fire. The whole bears the mark of great antiquity, and as if some violent convulsion of nature had taken place at some very distant period. In the ravines huge masses of rocks have been hurled and tossed about, and there are deep rents and fissures where the mountain torrents have poured down from time to time. All indeed has a most extraordinary and wild appearance. The first broken range of hills are about 1,200 feet above the level of the sea-shore in the background, distant about 4 miles, they tower to the height of at least 2,000 feet, apparently of the same formation as the near range. In the valleys some few stunted specimens of the tamarick abound, and a coarse kind of grass. The marks of the gazelle, hyena, and jackals are very thick; but we did not see a single creature.

We halted here, having our tent pitched close to the north side of the church, which latter we made use of as a kitchen, thinking that perhaps we might have a chance of shooting something (not that we were at all in want of any food, for we were amply supplied with all sorts of good things, and our boatmen kept us supplied with fuel), but it was in vain, for as before mentioned nothing was to be seen.

After wandering through one of the ravines as we returned, we cast our eyes around on the desolate scene, fancying that we were the first Europeans that had ever visited the spot, we were surprised on observing an inscription which we had no difficulty in deciphering; it ran thus:—A BALL ACBAR 1848, in three lines! It quite destroyed all our remaining romance; it looked little less than sacrilege, thus to treat a huge block of time-honored sandstone, that had probably some centuries ago been hurled from its proud position on the very summit of the range! I declare I felt quite vexed.

On Sunday, the 27th, we again at daylight embarked, and started on our voyage, coasting along the highland of Aboo Deraj to N.W. We, at about 10 A.M., arrived at a place called "Goobul El Boos" or the Bay of Reeds, and immediately to the north of the hills we found a spring of mineral water, of bitter flavour; there are also numerous springs of salt water; the ground for the space of a mile in diameter is thickly covered with salt of the very purest quality.

There is an extensive swamp filled with reeds, and a coarse kind of grass. These reeds are used for thatching and mats.

We pitched our tent on the beach close to a small but powerful stream of tepid water, which rushes out to the sea with great velocity and a loud murmuring sound. It is used by the Bedouins for their sheep.

We were visited by several of the Bedouins of both sexes of the Terah-bin tribe, who were very civil. At about 4 P.M. they brought their flocks down to water, at least 2 or 300 herd of very fine-conditioned looking sheep and goats thus passed in review before us, and were then driven off to some caves in the mountain side, where they are closed up for the night for fear of the prowling hyenas. These people of the 19th century are of the same kind of manners and customs as their ancestors 2,000 years before the Birth of Christ; they still dwell in the caves of the mountains, and according to the old customs, the women do all the work, while the "Lords of the Creation" wander and saunter about in the most indolent manner, spending their whole time in smoking and talking. The women follow and tend the flocks, with a child perhaps

slung on one side, and at her back a bag full of goat's hair which she is engaged in spinning into yarn, to make their abbas or cloaks for the winter. The women all carefully concealed their faces, and were all *dressed*—if such a term can be used—in rags of blue dungaree, very dirty, and savouring strong of all that is unpleasant, so strong even in passing by, one could not help inhaling the noxious smells.

In the evening we prepared to embark by striking the tent, but could not start, as the boat lay aground, and we had to wait for the tide to rise. The swamp soon began to throw off its noxious vapours, and the musquitoes were very troublesome. We got away, however, by about 9 P.M.; the wind being very light, we only made 13 miles during the night.

The Arabs do not know the valley between Aboo Deraj and Ataka at the "Valley of Moses,"* as it is marked on the charts. They call it Wady Towareek† from the name of the tribe, or at least the principal tribe that wanders through it.

About six hours' journey from this commences the petrified forest. One of the Bedouins has promised to bring me a camel load of specimens from thence to Suez. He offered to conduct us and provide us with donkeys or camels, but we were afraid of the heat.

A little after sunset I tried the temperature of the mineral waters while the atmosphere was 85 deg., that of the water was 90 deg., rising instantly to that, and falling when taken out to 82 deg. on account of the evaporation.

These springs have, I believe, never before been visited by any Europeans. I have never heard any mention of them, neither are they noticed on Moresby's charts. I must make another visit to them at some more convenient time. It is too hot to expose oneself this weather.

On the 28th we pitched under the highland of Ataka, and having breakfasted, we again embarked and arrived on board the ship at 8 P.M.

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* Wady Mousa.

† I have since been told that Towareek signifies the little or contracted pass.

ART. XII.—*Memoranda and Extracts from various sources, relative to the capabilities of the River "Juba" in East Africa for Navigation; and the Resources of the Countries adjoining it.* By Commander H.A. FRASER, H. M's. I. N. (Communicated through the President.)

[Read before the Society, April 17th, 1862.]

NOTWITHSTANDING the vast importance to science and commerce of a more extended knowledge of the geography, population, and products of the great Continent of Africa, one large and interesting tract of country remains, as yet, to us, a closed book.

Stretching from the Juba river, near the equator, to Gardafui towards the north, and to the westward, beyond the confines of Southern Abyssinia, regions unexplored exist of which we possess but little knowledge, excepting from the meagre and unauthentic accounts of native traders.

Some slight, but extremely interesting information regarding the inhabitants of the coast line, has been furnished by Surveying Officers of the Indian Navy, from whose journals extracts will be found below.

It appears unaccountable that while British enterprise has for years been steadily pushing into the interior of Africa, and connecting the broken links of discovery from all other points, undeterred by the hostility of savage races, and the deadly nature of the climate, North-East Africa, universally described as possessing a salubrious climate, fertile soil, an industrious population, mineral wealth, and navigable rivers, has till now, failed to attract the traveller and the merchant to its shores.

The river Juba (also known by many other names) has long been believed, on the authority principally of native merchants, to be navigable by boats for a great distance from its mouth, which is in latitude 0° 14′ S. and longitude 42° 39′ E.

Many conflicting opinions exist as to whence it takes its rise, which can only be finally settled by exploring its source. This much, however, is clear, that from whatever point of the great mountain ranges of South Abyssinia it flows, should it prove to be navigable as stated, its acquisition as an additional great highway of commerce, will be equally valuable and important.

The Juba is described as flowing in a south-easterly direction to the ocean.

North-east of its mouth, and about ten miles inland of the seaport-town of Brava, is the "Haines" river, visited by Lieutenant Christopher, I. N., in 1843. This river, running parallel to the coast for a considerable distance, is said to end in a swamp or lagoon. Its waters probably percolate through the loose sandy soil to the sea.

In the selection of the subjoined extracts, I have confined myself to the latest and most trustworthy authorities within my reach.

In 1811, Captain T. Smee, Commanding the H. C. Cruizer *Ternate*, "engaged in a voyage of Research on the East Coast of Africa,"* reports in his journal that he was informed by the Sooltan of Patta (in latitude 2° 09′ S. and longitude 42° 01′ E.) "that the Rogues river (the Juba) was of immense extent, that its sources were far beyond his knowledge; and that a great number of slaves were brought down it to Brava."

A note appended to this journal, mentions that "the late Captain Seton, the Company's Resident at Muscat, states on information obtained from some people of respectability in that place who were well acquainted with the part of the African Coast in question, that a river of immense extent, known to the natives by the name of Neelo (Nilo), and said to have its source in common with the Egyptian river of that name, discharged itself in the Indian Ocean, in about 0° 05′ N. latiude; near the mouth it is called the Govindkhala" (one of the known names of the Juba). "That the length of its course is about three months' journey, and nine weeks' journey from the mouth, stands the large city of Gunamma, up to which, the river being navigable, immense quantities of slaves, elephants' teeth, &c., are brought down within a short distance of Brava, to which (the river then taking a more southerly direction) these articles of merchandise are afterwards carried overland, and either disposed of there, or sent to Zanzibar."

Captain Owen, R.N., who surveyed the East Coast of Africa under orders from the Admiralty, in 1823-24, and 25, remarks in his Narrative,† "We now made the mouth of the river Juba, known by the Africans as Wowweendee. This river rises in Habeshy or Abyssinia, and may be navigated in boats for three months from its mouth. The

* *Vide* Transactions Bombay Geographical Society, vol. vi.

† Vol. I, Page 363, of Narrative of Voyages to Africa, Arabia, and Madagascar.

bar is narrow but has plenty of water." He also describes the Durnford* river as the only port where a vessel could find shelter from bad weather at all times of tide, for a distance of 154 miles. This river, he says, disembogues in latitude 1° 13′ S. and longitude 41° 50′ E. Lieutenant Boteler, who ascended and surveyed the river for seven miles, says, —" The country around seemed capable of the highest cultivation, varying from a light red, to a dark fine soil, and if there is a healthy spot in this part of Africa, I should say at once, it was this."

In a " Report on the Mijjertheyn tribe of Somalis, inhabiting the district forming the North-East point of Africa, by Lieutenant C. J. Cruttenden, I. N., Assistant Political Agent, Aden,"† (apparently drawn up in 1843,) that Officer states—" I refrain from making any remarks on the rivers, &c., that have afforded such field for discussion. Of the practicability of exploring the source of these rivers, I have no doubt, nor should I apprehend any hostility on the part of the natives if the traveller were duly attended by a Mijjertheyn Chief. Repeated offers were made to me to visit the stream called the Wabi or Haines river of Lieutenant Christopher (Wabi or Webbi in the Somali language means a river), I only regretted that I was unable to do so."

Lieutenant Cruttenden adds this important note :—" Since this was written, I have met with a gentleman, Mr. Angelo, of Zanzibar, who has recently sailed above two hundred miles up the Juba, and suffered no ill-treatment."

In a " Memoir on the Western or Edoor Tribes, inhabiting the Somali Coast of North-East Africa, with the Southern branches of the Family of Darrood, resident on the banks of the Wadi Shebeyli, commonly called the river Webbi,"† by the same officer, dated April 1848, Lieutenant Cruttenden mentions on information derived from the native traders to Hurrur, that the Webbi Shebeyli and the Haines river of Lieutenant Christopher are the same.

The Kafilas from the banks of this river, and the small province of Gunana to the south of it, and from Agahdur to Berbera, are, he says, the most valuable caravans of season. They frequently exceed 2,000 camels in number, " bringing ivory from the Galla tribes of Sidama, south of the Webbi Gunana (the Juba), ostrich feathers, musk, myrrh, and frankincense."

* Vol. ii, p. 171, of Narrative of Voyages to Africa, Arabia, and Madagascar.

† *Vide* Transactions Bombay Geographical Society, Vol. vii.

‡ *Vide* Transactions Bombay Geographical Society, Vol. viii.

In an "Extract from a Journal kept during a partial Inquiry into the present Resources and State of North-Eastern Africa, with Memoranda, by Lieutenant Christopher, I. N., Commanding the H. C. Brig of War *Tigris* in 1843,"* Lieutenant Christopher states, regarding the Haines river, that being informed of its existence when at Zanzibar, by a native of that place, on the voyage of the *Tigris* thence to Aden, he landed at Brava to explore it. He says "I was received to my surprise, in a warm and friendly manner, and conducted to the best-looking house in the place, by a Somali chief, named Hadjee Awisa." Here he was visited by "a man of very unpromising appearance," who presented some papers for perusal, "the first" of which "gave the bearer a high character for honesty and fair dealing, as a broker or agent for purchasing cargoes, hides (principally), and ivory. The next happened to be a statement written by the harpooner of an English whaler-boat, acknowledging the great kindness and attention shown him by the bearer Dera, he having with five others when chasing, a whale unfortunately lost his ship, and making for the nearest land, reached about sixty miles north of Mugadesha, (in latitude 2° 02′ N. and longitude 45° 25′ E.) in nine days; two of his companions died from exhaustion, and the officers expiring after reaching the shore, they were brought down to Mukutshu, by the natives, and, I fancy, sold as slaves unknown to themselves. Dera says, he rescued them from the people of Mukutshu for thirty German crowns, which is probably true, as the statement says they were badly off until their arrival at Brava."

"The papers further prove that Brava for fourteen years, has been a welcome port to European and American traders, several of which have resided on shore for days at a time. The chiefs, seven in number, say that Captain Owen's visit reconciled them to European intercourse. The river Juba is under the authority of the Sheiks of Brava."

Lieutenant Christopher discovered the Haines river, seven or eight miles inland, north of Brava. It there, after running from the north, turned to the westward; it was from 70 to 150 feet broad, and from 10 to 15 feet deep, with a current of about a mile and a half per hour (this was during the driest season of the year, viz. in March).

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* *Vide* Transactions Bombay Geographical Society, Vol. VI.

He describes the country "as inundated two miles from its (the river's) banks, and Indian corn and jowari flourishing nicely." "The country all round is spotted with trees, and appears level as far as the eye can reach."

Leaving Brava, he proceeded northward in the *Tigris*, landing at Moongnia, Merka, and Mukadesha.

From the two latter towns, he found the river distant about ten to twenty-two miles respectively.

Opposite Merka the stream was 150 feet wide, 17 feet deep, and the current two to three miles per hour.

Inland of Mukadesha it was 250 feet broad (depth and current are not noted).

Lieutenant Christopher explored the river for a distance of 110 miles from Brava, and speaks in glowing terms of the hospitable disposition and industrious habits of the natives of the country, the fertility of the soil, and salubrity of the climate.

He describes "large herds of cattle roaming over tracts uncleared for cultivation." "The green of the country was refreshing to the eye, all was verdure or lately reaped ground, the country in the distance freely sprinkled with trees."

When out in the villages, some miles distant from the town of Giredi (24 miles inland of Mukadesha), he says,—"The behaviour of the people, old and young, was most pleasing and natural, everywhere curiosity, good humour, and hospitality met us." * * * "The population is rapidly increasing, and the people have every appearance of being well fed. Disease is rare amongst them: no particular one was noted; men of seventy, stout and healthy, go on fatiguing journeys, and the resident Arabs speak in raptures of the genial climate and abundance of all things." * * * "In this delightful climate, all of us felt an elasticity of spirits which will not soon be forgotten." * * * "The whole country is of the richest soil: indigo, cotton, and sugar-cane would no doubt thrive." Elsewhere Lieutenant Christopher says,—"The sugar-cane and all Indian fruits grow luxuriantly;" he also mentions that the Sheikh of Giredi was clad in a cotton dress, "the growth and manufacture of the country," and that cloths were exported from Merka to Berbera, thus proving that both sugar-cane and cotton are already among the staples of the country.

The Journal continues,—"It may with confidence be remarked, that the Juba is open to English enterprise; the friendly chiefs of Brava invited me to enter that river in the most friendly manner, offering their services in any way. I had many secret offers, which, had I been at liberty to avail myself of, would, I cannot doubt, have ensured my safety to the borders of Abyssinia, from the equator."

"I may remark that, had I lent a willing ear to all the reports of the ferocity and bloody intentions of individuals, I should not have gained any information at all."

Under the head of "General Remarks," Lieutenant Christopher writes,—"The almost incredible quantity, 1,300 lbs. of winnowed grain, can be purchased for one dollar on the banks of the river." * * * "The tame animals are oxen with humps, camels, black-headed sheep (with large tails), goats, donkeys, dogs and cats; the wild, the elephant, camel-leopard, buffaloe, zebra, ostrich, porcupine, river horse, alligator, many varieties of antelope, two species of monkey, and the civet-cat."

"The women are the spinners of cotton, wood and water-carriers, and cooks; the men go journeys, weave, and cultivate the soil."

Sir William Cornwallis Harris in his "Highlands of Æthiopia," strongly and ably advocates the exploring and opening of the Juba, by British enterprise: he writes,—"The baneful climate of Africa is the obstacle which has hitherto opposed the introduction of agriculture, by precluding the permanent residence of those born under a happier sky; and the chief object in seeking geographical information, has been to discover some point whence the object may be accomplished with safety: that point is presented in the North-East Coast, where, from no great distance inland, to an unknown extent, the spontaneous gifts of nature are transcendently abundant. The people are prepared by misfortune to welcome civilized assistance. The soil is fertile and productive, and the climate, alpine and salubrious, is highly congenial to the European constitution."

"All these countries are believed to be accessible from the Juba, commonly called the Govind, which is said to rise in Abyssinia, and to be navigable in boats for three months from its mouth."

"Its embouchure is in the territories of the friendly chiefs of Brava, the hereditary representatives of seven Arab brothers, who were first induced to settle on that coast, by the lucrative trade in grain, gold, ambergris, ivory, rhinoceros horns, and hippopotamus teeth." The

climate, even so far south as Mombas, is notoriously good, and the Government affords a not less striking contrast to that of the Western Coast, where the regions in corresponding latitudes are subject to bloody despotism."

"Measures at once profitable, simple, and effective, might therefore be adopted, by the purchase, or rent of land on the river, which is conjectured to be the Gochob, and would seem to promise easy access to the very hotbed of slavery. It has been well remarked by Mr. McQueen, in his Geographical Survey, that "rivers are the roads in the Torrid zone," and should the stream now under consideration, fortunately prove fitted for navigation, the introduction through its means, of the essential requisites to the happiness and emancipation of the now oppressed continent, could not fail to confer the most inestimable advantages. But few people are more desirous and capable of trading than the natives of Africa, and the facilities with which factories might be formed, is sufficiently proved by the reception heretofore experienced in various parts of the continent. Abundance of land now unoccupied, could be purchased or rented at a mere nominal rate, in positions where the permanent residence of the white man, would be hailed with universal joy, as contributing to the repose of tribes, long harassed and oppressed. The serf would seek honest employment in the field, and the chiefs of slave-dealing states gladly entering into any arrangement for the introduction of wealth and finery, would, after the establishment of agriculture, no longer find their interest in the flood of human victims, which is now annually poured through the highlands of Abyssinia."

"No quarter of the globe abounds to a greater extent in vegetable and mineral productions than tropical Africa; and in the populous, fertile and salubrious regions lying immediately north of the equator, the very highest capabilities are presented for the employment of Capital, and the development of British industry. Coal has already been found, although at too great a distance inland, to render it of any service without water communication. Cotton, of a quality unrivalled in the world, is everywhere a weed, and might be cultivated to any requisite extent. The coffee which is sold in Arabia as the produce of Mocha, is chiefly of wild African growth; and that species of the tea-plant which is used by the lower orders of the Chinese, flourishes so widely and with so little care, that the climate to which it is indigenous, would doubtless be found well adapted for the higher flavoured and more delicate species so prized for foreign exportation."

"Every trade must be important to Great Britain which will absorb manufactured goods, and furnish raw material in return. Mercantile interests on the Eastern Coast might, therefore, quickly be advanced by teaching the natives to have artificial wants, and then instructing them in what manner those wants may be supplied through the cultivated productions of the soil. The present is the moment to essay this, and so promising a field for enterprise and speculation ought no longer to be neglected or overlooked."

"Much has been written, and great praise most justly bestowed upon the policy which has seen in many a barbarous location the future marts of a boundless and lucrative commerce, the centres whence its attendant blessings, knowledge, civilization, and wealth, would radiate amongst savage hordes. Here are no deserts, but nations already prepared for improvement, and countries gifted by nature with a congenial climate, and with a boundless extent of virgin soil, where indigo and the tea plant flourish spontaneously, and where the growth of the sugar-cane, and of every other tropical production, may be carried on to an unlimited extent. Regions producing grain in vast superabundance, and rich in valuable staples, cotton, coffee, spices, ivory, gold-dust, peltries, and drugs,—all, in fact, that is requisite to impart value and activity to exchange."

In a Report on the Zanzibar Dominions, by Lieut.-Colonel C. P. Rigby, Her Majesty's Consul and British Agent at Zanzibar, published in 1861, he states,—"There are several navigable rivers on the East Coast of Africa, within the Zanzibar dominions, but they have never been explored far by Europeans, and very little is known concerning them. The chief are the river Lindy, situated in about ten degrees South; the Roovooma in about 10° 25′ South, and which is navigable for about fifty miles from the sea, and is said to be the largest river on the coast, north of the Zambesi. The Masoonga, Lufiji, Shamba, Durnford river, and Juba, are broad, deep streams, but have never been explored."

The following Tables show the value of the Import and Export Trade between the Port of Bombay and the East Coast of Africa for various years subsequent to 1820, and for the past five years 1856-57 to 1860-61 :—

IMPORTS.

Years.	1820-21	1824-25.	1829-30	1834.	1838.	1847-48.	1850-51.	1856-57.	1857-58.	1858-59.	1859-60.	1860-61.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Merchandise and Horses	3,30,892	3,70,291 4,000	2,08,380	2,98,092	6,31,206	10,53,175	13,25,962	18,36,595	19,95,796	22,11,822	12,23,559	13,29,729
Bullion and Specie.	2,11,687	32,596	1,77,826	24,492	3,900	1,26,890	1,33,535	1,81,000	6,73,618	8,13,425	8,60,320	4,68,210
Total....	5,42,579	4,06,887	3,86,206	3,22,584	6,35,106	11,80,065	14,59,497	20,17,595	26,69,414	30,25,247	20,83,879	17,97,939

EXPORTS.

Years.	1820-21	1824-25.	1829-30	1834.	1838.	1847-48.	1850-51.	1856-57.	1857-58.	1858-59.	1859-60.	1860-61.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Merchandise	1,76,675	2,21,175	3,81,202	2,82,921	6,37,289	6,69,890	6,47,369	13,93,169	13,23,162	13,31,851	12,83,548	6,93,691
Treasure	..	..	..	..	8,000	78,924	95,105	1,26,515	7,800	27,000	5,800	28,600
Total Exports ..	1,76,675	2,21,175	3,81,202	2,82,921	6,45,289	7,48,814	7,42,474	15,19,684	13,30,962	13,58,851	12,89,348	7,22,219
Total Imports ..	5,42,579	4,06,887	3,86,206	3,22,584	6,35,106	11,80,065	14,59,497	20,17,595	26,69,414	30,25,247	20,83,879	17,97,939
Aggregate value..	7,19,254	6,28,062	7,67,408	6,05,505	12,80,395	19,28,879	22,01,971	35,36,279	39,90,376	43,84,098	33,73,227	25,20,220

The decrease of Imports and Exports for the years 1859-60 and 1860-61, was probably owing to the same causes which are stated in Lieutenant-Colonel Rigby's Report on the Zanzibar Dominions, to have affected the trade of that Port. He says,—"The tonnage of the merchant shipping entered at Zanzibar during the past year (1859) amounted to 23,340 tons, being 3,619 tons less than in the previous year. Several circumstances have occurred to check the trade of this port during the past year: the visitation of cholera in the early part of it, a threatened invasion from Muscat, and the rebellion of one of the chief tribes of Arabs against the Sultan; and to these causes must be added the very extensive slave trade carried on by the French at the ports on the East Coast, south of Zanzibar, as so many of the country craft, which would otherwise have been engaged in conveying produce to Zanzibar, were more profitably employed in transporting the slaves from the coast to Nossi Beh and Mayotta. I heard of fourteen slave ships being at Nossi Beh at one time, waiting for cargoes. Until stopped by the French Government, this traffic in slaves threatened entirely to ruin all legitimate trade on the East coast of Africa."

Lieutenant-Colonel Rigby further states the aggregate value of the trade of Zanzibar alone, to have been in the year 1859, £16,64,577, viz:—

Imports	£9,08,911
Exports	£7,55,666
	£1,664,577

Aptly and truly does Lieutenant-Colonel Rigby remark,—"The trade which has been created during the above period (viz. since 1834) is certainly surprising, when it is considered that it has been developed under the primitive rule of an Arab Chief, and it affords a proof of the great resources of Eastern Africa."

The above extracts from writers well known for their scientific knowledge and research, of unimpeachable integrity, conversant with the subject, and deeply impressed with its importance, may, it is hoped, urge a claim on the consideration of Government in the interests of humanity, science, and commerce, to assist in carrying civilisation into regions so long neglected, by exploring the navigable rivers of the North East Coast of Africa, and thus opening the natural channels for trade to British industry and enterprise.

ART. XIII.—*Miscellaneous Observations upon the Comoro Islands.* By LIEUTENANT COLONEL LEWIS PELLY, H.M.'s Acting Consul at Zanzibar.—Contributed by Government.

THERE are four Islands in this group, of which Comoro proper is the northernmost, the rudest, and the largest, having a length of about thirty, and an average breadth of about ten miles.

Nearest to the southward of Comoro proper is Mohilla, which is the smallest of the four Islands.

Johanna lying south-east of Mohilla, and distant from it some thirty miles, is the second Island in respect of extent.

And Mayotta, lying to the southward and eastward of Johanna at a distance of about thirty miles, is somewhat smaller in area than the latter Island.

In former years Mayotta was under the nominal suzerainty of Johanna; but between the years 1830 and 1840 the chiefs of Mayotta threw off their dependency, quarelled among themselves, and fell to the intrigues of the French. In the year 1841 the French established themselves on the little Island of Zaondizi, lying to the north-east of Mayotta, and forming a connecting link between its mainland and the outlying Island of Pamanzi. The French gained their landing by espousing the cause of one of the contending chiefs, upon the condition of his ceding Zaondizi to them. Subsequently, this chief was induced to surrender all his sovereignty in favour of the French, in consideration of an annual pension of about two hundred pounds sterling. Zaondizi was fortified; quarters for a Commandant and Staff were erected; an Arsenal was established, as also an Hospital; the sea faces of the Island were scarped; batteries commanding the harborage or anchorage were erected or were commenced; and plans were submitted to the Home Government for rendering Mayotta a Military and Naval position of the first class. These plans, however, if ever seriously entertained, seem to have been discarded since the Revolution of 1848. Mayotta, like the other Islands of Comoro, has been comparatively neglected by the Imperial Government, and remains for the present a minor Military Colony, under a Commandant Superieur and Staff,

stationed on Zaondizi; while the mainland is occupied by some eight sugar-cane planters holding estates, which last year exported in the aggregate some fifteen hundred tons of sugar.

Yet, though actually unimportant for aggressive purposes, the position of Mayotta possesses considerable natural and geographical advantages. It is astride our line of communication with the east, *viâ* the Cape: it is in the middle of the Mozambique Channel, conveniently near to Madagascar, to the East Coast of Africa, to the other Islands of the Comoro group, and to Zanzibar; while it is not so distant from Bourbon as to render it of no avail as a harbour of refuge to vessels of war, cruizing near that shelterless station. As to its natural advantages, the reef-locked and always calm anchorages of Mayotta, extend over a length of more than thirty miles, with an average breadth of four or five miles.

The climate of Mayotta was long reputed as being very unhealtly, owing to its marshy grounds, and to a belt of mangroves margining its sea line. But the commandant informed me that the unhealthiness of the frontier was greatly overstated, and that nothing but money considerations prevented him transferring his head quarters from Zaondizi to the mainland. Zaondizi was too confined; and was, moreover, destitute of sweet water. I saw myself but one well on the Islet, and that was quite brackish.

Communication is maintained with Mayotta by means of a small steam-schooner of war, which runs once a month to the Seychelles, and occasionally moves round thence to Bourbon, and so back to Mayotta, touching *en route* at the small French Colonies of St. Mary's on the East Coast, and of Nossi Bé on the West Coast of Madagascar. I found some thousand tons of coal, and a little patent fuel, stored at Zaondizi.

The staple product of Mayotta is sugar. It is asserted that if well and thoroughly cultivated, the Island might export from fifteen to twenty thousand tons per annum. The cane lands seem to be for the most part occupied. But the planters do not at present thrive. Want of labour is their general complaint; and absence of labour implies presence of weeds, and otherwise careless and unremunerative planting. I believe also that the sugar-cane disease, so prevalent at the Mauritius, has shown itself also at Mayotta. The activity of our squadron on the East Coast of Africa is alleged to be the great and increasing obstacle to the inauguration of African labour. Coolies from India have been

tried, but they all died rapidly. Probably this mortality may have been due to some accidental cause ; for there seems no reason why Coolies should thrive less well at Mayotta than they do at the Mauritius, where every one of them enjoys the climate ; makes money ; throws off his ancient prejudices ; though a Mussulman, drives a pork butcher's cart ; and, though a Hindoo, rears an English-looking wood cottage, plants a garden plot, and may be seen of an evening seated with his wife at the cottage door, dressed in very English-looking coat and gown.

Reverting to the want of African labour at Mayotta, I saw the other day a note written from one of the French planters to Mr. Consul Sunley, begging for aid in the collection of some free labourers from Johanna. The note concluded thus,—"We hoped we were rid of that Captain Oldfield ; but just when the *Lyra* goes home, he shifts his command to the *Ariel*, and teaches the *Penguin* his business. It is too bad."

In its general appearance Mayotta is a broken, hilly looking Island ; moderately wooded, rocky and barren in its headlands. The average of its hills may be from two to five or six hundred feet in height, with here and there low green patches of sugar-cane intervening. One or two peaks, and one cone of remarkable aspect, may be about two thousand feet above the line of the sea. The population of Mayotta is stated to number about seven thousand souls.

Johanna is at present a Sultanut, without any direct relations with the other Islands of the Comoro group. It is governed by a chief, or so called king, named Abdullah, a young man of some intelligence, agreeable manners, and favourably disposed towards the English. This family has ruled the Island for the period of about one century, when the founder of the present dynasty overturned an anterior dynasty called Domoni, whose chief town was situate on the East Coast of Johanna. That Domoni is still represented by a village of the same name, and by a female who claims lineal decent from the old rulers, and who resides upon their old estate.

The founder of the present reigning family was named Abdullah. He was succeeded by his son Aloee, and he in return by his son Abdullah. Then came Aloee II., who was dethroned, and died at the Mauritius. This Aloee was the father of the Colonel Prince Abadoo, who recently appeared at Madras, and whose proceedings I have reported on in a separate letter. Aloee II. was supplanted by his uncle Salem, who was at his demise succeeded by his son, the present Sultan Abdullah. The capital of this family has been and still is Mootzamoodoo on the North

Coast of the Island. This town, however, is commonly called Johanna by strangers. It has no harbour; but ships anchor safely in its road-stead, close on shore, about a mile to the westward of the town, and near a fresh water stream.

The population of Johanna is roughly estimated at twelve thousand souls. These are distinguished among themselves as slaves, bushmen, Johanna men, and miscellaneous strangers. It is probable that the bushmen are the aborigines of the Island, or descendants of immigrants from the East Coast of Africa at some very remote period. The Johanna men are probably a mixture of bush and foreign blood, shading up from Caffré features into those of the pure Arabs. A *lingua franca* is current, called Johanna language, and the Sowahilla, or one of the littoral dialects of the African Coast, also obtains. The Arabic character is commonly used in writing, and this whether the language of correspondence be Arabic, Johannese, or even English. It is unnecessary to add that letters so charactered are more easily written than read. The people of Johanna profess the Mahomedan religion, but they are by no means bigotted. They are apparently quite free from the vice of drunkenness; though one finds in the presence of the venereal disease the commonest sign of incipient civilization.

The climate of Johanna seems to be salubrious. Sea breezes and frequent showers temper the heat. The soil is composed of the detritus of volcanic rocks, and the decay of vegetable matter. In the valleys, and more especially on the low lands bordering on the sea-shore, the soil, though stony, is deep and rich, and well adapted for the sugar-cane or for cotton. Coffee thrives excellently on the middle slopes of the hills: perhaps the inland and sheltered acclivities, at a height of from two to three thousand feet above the level of the sea, would be the zone where coffee plantations might be most successfully attempted. Mr. Sunley planted a small patch with coffee a few years ago, and the berry is excellent. I transmit a sample for deposit in the Central Museum at Bombay. Mr. Sunley is of opinion that ultimately coffee will form the staple produce of the Island.

The natives cultivate but slightly and carelessly. Paddy, sugar-cane, cocoanuts, sweet potatoes, manioc, pumpkins, and plantains, constitute their food. Their mode of expressing molasses is similar with the rude process obtaining in Guzerat.

I have observed on the Island belts of cocoanut-trees, with occasional areca palms; the iron-wood is found in abundance on the hill slopes;

and lower down the syrus, the neem, the banian-tree, the tamarind-tree, and a sort of India-rubber-tree. Mr. Sunley tells me he found one specimen of the gamboge-tree. I find also the orange, guava, sago-palm, a great variety of herbs, the plantain, the wild bean, and countless varieties of wild flowers.

The trade of Johanna, as of the Comoro group in general, is comparatively trifling; nor does it increase. The total value of the past year's imports in Johanna may be about £4,500, of which some £3,500 may represent the value of British manufacture. Some little traffic is carried on in Dhows with the French Settlements at Mayotta and Nossi Bé, with Madagascar, with the East Coast of Africa, and with Zanzibar; but the total of goods so interchanged between Zanzibar and Johanna does not, perhaps, aggregate a higher value than £400 per annum. The principal articles of this coast traffic are stated to be cotton goods, iron-ware, glass, muskets, powder, and miscellaneous small European manufactures. These are bartered for sandal-wood, ebony, hides, goat-skins, gums, coir-yarn, wax, tortoise-shell, &c. There is some trade also in silk and cloth cloaks, in turban pieces, and in ornamented swords.

The principal export of the past year has been some four hundred tons of sugar, grown upon Mr. Sunley's estate at Pomony Harbour, on the south-western angle of this Island. This harbour, which is small but convenient, and capable of affording anchorage for five or six large vessels (this number of square-rigged vessels have already anchored at one and the same time in Pomony), has recently become a Naval Depôt, and a store-ship is permanently anchored there. Immediately above the bay, between the mountains and the sea, stretches Mr. Sunley's estate. The soil is rich but boulder-strewn, and was in the first instance covered with rank bush, or with palm-groves, or was mere marsh land. It seems strange indeed to see the smoke of a factory rising as one nears this Island shore. And the story of Mr. Sunley's establishment here appears to me to be a very remarkable instance of the sound sense, and indomitable energy, and perseverance of the Anglo-Saxon, organizing a community of semi-savages. Mr. Sunley came originally to the Mozambique with some command of capital, and with the intention of operating largely in the markets of its neighbourhood. He was accompanied or followed by four associates, of whom two died, a third was lost at sea, and the fourth broke his back. His correspondents in London failed; his agents at Nossi Bé and Zanzibar

operated for him at a loss. A power of attorney was used to his detriment in the Mauritius; and the Portuguese authorities on the East Coast of Africa seized his schooner on plea of its having entered Angoxa. His stores at Johanna were burned down. Eventually, Mr. Sunley found himself on the Island of Johanna (then in a politically unsettled condition) without capital, and without any associate or European assistance. Nothing daunted, he set to work, consolidated the government, explored the Island, obtained a grant for a period of forty years of his present estate at Pomony; cleared it; organized five hundred men, who had never laboured before, into sugar-planters and boilers; put up his own sugar-mill; erected his own steam engine; taught a Caffré boy to drive it; learned himself while teaching others the art of sugar-growing; built his own carts; broke in his own cattle; reared his own factory and dwelling-houses; cut his own roads; surveyed his own estate; discovered and land-marked his port. This was not all, a small currency was required for the payment of his labourers. He bought up the copper currency at Mozambique, and re-stamped it in Johanna. Silver he found in the French dollar; and these he cut into quarters for shilling currency. He would not distil rum, nor allow tobacco to be grown. But he laboured early and late with his own hands to instil regular and orderly habits into his savage followers. He attended carefully to their complaints, both physical and mental. The results of years of this heavy labour are now visible in a most thriving estate; a contented, sober, and healthy-looking body of five hundred negroes; and a heavy harvest of splendid cane, realizing from £28 to £30 per ton at the Mauritius market.

Nothing could be more beautiful than the situation of the estate itself: on the right the bright sea breaking white over the coral reefs, far out in the calm and purple sheening mass; a rocky, indented coast, green with various shrubs and trees, and cheerful with multitudes of white and pink convolvuli,—then a waving breadth of heavy laden cane, sloping up to the lower hills, and here and there intersected by romantic ravines, down which sparkle the clearest streams that prattle to you of home; above, and to your left, rise successive and loftier spurs, leafy green quite over their ridges, and down their tangled valley folds. You look still deeper inland, and the peaks rise now abrupt and fantastic; now in fair and stately proportions; yet always green even to their loftiest peaks (of nearly six thousand feet in height), with the foliage of many climates. Truly, it is a spot of surpassing beauty. No mile of

coast but would make the fortune of an English watering-place. Serici in Spenzzia is not more picturesque than Mootzamoodoo clustering on the shore, overlooked by its citadel; back-grounded by a noble headland, softening landwards into boundless woods. No Isle of Greece is sharper in its outline, nor lovelier in its colourings, than the promontory. The shores of the Black Sea from the Bosphorus to Trebizonde, boast no dells more romantic, nor any hills more richly clad, than those that I now poorly paint; fit Island for an industrial Robinson Crusoe; and worthy a description from De Foe, when he imagined Captain Jack, and sent him to wander on the shores of the Mozambique.

To return: I have enjoyed many interesting conversations with Mr. Sunley upon the questions of crops in these regions. Sugar-cane, indigo, coffee, cotton, all flourish. East Africa seems to be the habitat of coffee: it grows there, and is picked in a wild state. A venture in indigo grown at Noss Béi fetched six shillings and six pence per pound in the London market, when the finest quality of Bengal indigo was realizing seven shillings per pound. Sugar ground can be made to produce from three to four tons of sugar per acre in the Islands of Johanna, Mohilla, and perhaps Mayotta. The question of selection of farming is purely one of paying. Sugar pays best, ergo it will be preferred in farm by any colonist who understands his own interests. Next to sugar comes coffee as a remunerative plantation. Cotton under the price of labour obtaining in the Mozambique might do little more than pay for picking: it certainly would not bear any great length of overland carriage.

Take instances: Suppose a colonist desire to farm an estate on the now unoccupied land in the Comoro group, which should turn him out a gross yield of 1,000 tons of sugar annually, and after the third year, from date of first starting, the account would stand somewhat as follow:—

		£	s.	d.
Sugar Mill, 1st Class	Machinery.	2,000	0	0
2 Batteries for Clarifying with 10 Vid-neyel's pans	Machinery.	1,500	0	0
10 Turbines and Engine	Machinery.	1,800	0	0
Buildings, with Iron Roof		1,500	0	0
Miscellaneous Material		1,000	0	0
Add.		£7,800	0	0
Cattle, Carts, &c.		500	0	0
Total of Stock		£8,300	0	0

Annual Outlay

	£	s.	d.
Interest on £8,300, at 10 per cent. for three years, say	2,500	0	0
500 Labourers, at £6 per head per annum for three years, with interest	10,000	0	0
Cattle, carts, maintaining for three years, say	1,000	0	0
European Superintendence at £1,000 per annum, three years	3,000	0	0
Contingencies	5,000	0	0
Total expenditure in three years on 1,000 tons' Estate	£21,500	0	0

To cover this outlay and provide for profits there would be :—

	£	s.	d.
A first year's crop of 400 tons, at say £26 per ton.	10,400	0	0
A second Ditto of 600 Ditto	15,600	0	0
A third Ditto of 1,000 Ditto	26,000	0	0
Total gross yield in three years	£52,000	0	0
Deduct.			
£6 per ton for freight, insurance, and risk	12,000	0	0
	£40,000	0	0
Deduct.			
Outlay during three years	£23,500	0	0
Net profit in three years	£16,500	0	0

Of course, during the subsequent years the annual outlay would remain as before, while the annual yield would be 1,000 tons = £26,000, minus £6 per ton freight, &c.—net yield of £20,000 = £8,000, say, outlay annual, equal £12,000 per annum on one thousand tons of sugar.

Now these 1,000 tons might be easily produced on 400 acres of land.

Suppose coffee were planted on a like extent, it might yield 8 cwt. per acre, selling on the spot at 50 shillings per cwt. or a gross yield of £20 per acre. Deduct cost of manufacture and of labour on the plantation, and you would average at the outside, under £15 per acre, or less than £6,000 per annum, on 400 acres of land, without allowing

for contingent outlays, and after having passed two years, before the plantation came into berry, and before, therefore, you could gather any crop whatsoever.

Again: suppose cotton to average 500 lbs. per acre, at 6 pence the lb., or £12-10s. per acre gross, this would be an unusually good yield; yet, after deducting for planting, cleaning, picking, &c., your gross yield would give in the shape of profits less than half its own value, say at the outside £5 per acre on 400 acres, or £2,000 per annum.

Thus: upon a farm of 400 acres, sugar shows as £12,000 to £6,000 against coffee; and as £12,000 to £2,000 against cotton.

Such is Mr. Sunley's practical view of the crop question in East Africa and the Mozambique. I concur in it.

Cloves do not pay as cargo. Some plantations have been tried at St. Mary's and at Zanzibar, where cocoanut plantations were cleared to make room for cloves; the latter are now scarcely paying as make-weight to cargoes.

As to tonnage of square-rigged vessels passing Johanna and touching there, it seems that during the past year—

9 British Men of War,
2 Ditto Prizes,
7 Ditto Merchantmen,
4 French Men-of-War,
1 Ditto Merchantman,
1 Portuguese Merchantman,
10 American Whalers,

Total.. 34, have called.

The revenues of Johanna are principally paid in kind, and the Sultan, who maintains a certain court, and keeps on foot a couple of hundred men armed and clothed after the European fashion, satisfies his chiefs and followers by grants in land and by provision of grain. The sums paid in money are trifling, though His Highness levies a Port-due upon vessels calling at his coast, and a duty of 7½ per cent. upon all goods imported.

The Island of Mohilla resembles that of Mayotta in its natural aspect; only Mohilla is perhaps the less picturesque of the two. The present queen, as I have mentioned in another letter, forwarded by this

opportunity, is only daughter to the late King of Mohilla, and *quondam* Prince of Madagascar, Ramanataca, who in turn was nearest surviving male relative to the great king Radama. The queen thus claimed to be heir to the throne of Madagascar; and as the *de facto* queen of Madagascar (widow of Radama) is recently deceased, should now, perhaps, be sitting on the Madagash throne. However, the late queen's son is really there, and the only doubt to be entertained in respect to his legitimate pretensions lies in the circumstance of his having been born eleven months subsequent to the death of his reputed father, king Radama. I visited the Queen of Mohilla a few days ago. She is a pretty Hindoo-faced person, not old, with a most unpromising-looking Arab husband, a pretty boy child, and a wonderfully expressive-looking Madagash nurse. Her majesty was polite, but pouted a good deal because one of her Dhows had been burned as a slaver. Her capital, Dowanee, is close along a reefy, inhospitable shore, with poor anchorage. A straight wall, about twenty or so feet in height, running parallel with the coast line, and pierced for a dozen or so guns, forms a defence to her village and her own residence. There she received me. But Mohilla is a poor, mean turn out.

The low lands, however, are stated to be well suited for sugar plantation; they are as yet quite unoccupied, and some labour is to be hired on the Island, whose population may number 4,000 souls.

Of all the Comoro group, Comoro proper is most remarkable in the vastness and the height of its desolate grandeur. Ever and anon it disgorges, from summits of eight thousand feet, streams of lava, which flood the flanks of its mountains, and rear or obliterate islands and promontories in the surrounding ocean. When Mr. Sunley recently visited Comoro, after an absence of four years, he found a lava reef of three quarters of a mile in length jutting out near his old landing place, and perplexing his topography. An officer who steamed round the Island last year could nowhere find the detached Islet, which is laid down on the Charts as being on the south-west angle. Comoro is almost destitute of sweet water. The people preserve the rain water, and brackish water is scooped from the sand near the sea line. The Island is wooded in parts, and exports a few cattle. But, as a whole, it is ruder, wilder, and more attractive, perhaps, both in regard to its inhabitants and its look of stern and lonely pride, than any other island I remember to have visited. To sail, indeed, under these stupendous volcanic

precipices is to receive into the mind the shadow of a gloom, compared with which that of Aden is cheerfulness—of outlines more fantastic than those of the Muscat coast—or a savage desolation before which Mekran itself is a soft and smiling scene.

The principal town in Comoro is Maroni. But the Island is partitioned among many chieftains, who are jealous of their several land and water holdings. A *casus belli* has, I understand, been found in the accident of a large fish running away with a canoe, and carrying it, line and hook, into the fisheries of a neighbouring chief. I once heard it observed that there cannot be two kings in Brentford, and it seems equally difficult for eight sultans to reign harmoniously in the Island of Comoro.

ART. XIV.—*Rough Notes, showing outline of the Country between Kurrachee and Gwadel.* By Assistant Surgeon J. LALOR, B.A., 2nd Regiment Sind Horse.

THE country bordering immediately on the sea-coast from Kurrachee to Gwadel, and included between parallels 62° and 67° E. longitude, might be aptly described as a bare and cheerless desert, intersected occasionally by low hills, with a scanty and almost purely periodic supply of water. Its shore line is singularly straight and even, the difference in the latitude of any of the places between the abovenamed points, being never more than a few miles.

In the road to Sonmiyanee, we crossed the terminal points of the great* Hala range of mountains, abutting the sea at Cape Monze, but ending chiefly in a series of low flat ridges of red and grey sandstone, with masses of loose shingle.

From here the range strikes N.W., and gives off at some distance inland another line (the Pubb Hills), striking S.E. towards the sea, and dipping very irregularly. These hills likewise run close to the coast. and Chilney island, some miles to sea, may be fairly considered an outlier,

Between these ranges, the Hab river winds towards the shore, and empties itself close to Cape Monze. It is a good stream with a pebbly bed, rises apparently high up country; near, it is said, is the valley of Zeedee, and contains water throughout the year.

The N.W. bank is high and steep, but gradually crumbling away, from water action, and silting up on the Kurrachee side, a valley producing abundance of grass. With a light brown loamy soil, the land is capable of cultivation, but the difficulty and expense of raising water on the right or west bank must leave the place a barren waste, for a very long time at least. There was a small patch of sowarree, and a few huts at the river's edge, but the people were merely a few wandering Noomreas.

The Tamarisk, Acacia, and Cactus trees grow, but do not flourish; and the spurs of hills near the coast are covered with a variety of wild Juniper, a jungle description of grewia (gango), bearing eatable berries, some mountain panic-grass, and a highly-scented description of catmint.

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* Brahoick of Pottinger's Map.

Looking northward the Pubb hills present an imposing outline, but become very broken and irregular, as they diminish towards the sea, forming here the natural eastern boundary of the province of Lus.

From this to Sonmiyanee, a distance of nearly thirty-five miles, the country is remarkably barren; but capable of cultivation if supplied with water. The first fourteen miles are over a grey sandy loam, and through deep and dry beds of mountain torrents. Of vegetation there is an occasional trace, the milk-bush and prickly-pear grow luxuriantly, but the absence of water imparts a scorched and dismal appearance to every thing about.

On rounding a hill of close-grained sandstone (red), and descending a pass about some forty feet, the road lies for a short distance along the beach, bounded inland, by high and desolate looking ridges of drift sand. The view on entering this pass, and the sudden drop on to the sea-shore is fine, and in the early morning, grand. A small bay of horse-shoe shape runs in, close to the bottom of the pass; and, I may mention here, more nearly corresponds with Saranga of Arrian, than any other between Cape Monze and Sonmiyanee. Tamarisk and Acacia jungle abounds to the very sea-side, and water may be obtained by digging from six to ten feet. It is of the worst possible description, very salt, and soon becomes putrid on exposure. From this to Sonmiyanee, the country is nearly all salt-land, and the monotony of the road, only relieved by the roar of the sea, heard loud and clear over the resonant *put*,* and by one green spot with a fresh water tank, a few wells and some Mango, Peepul, and Jamum (Jara Plum) trees. A tribe of Noomreas have a few movable huts there, and it is one of the great halting places for the pilgrims to Hinglaj. Immediately into Sonmiyanee the road lies across the dry bed of the river Vindoor, and over high ridges of drifting sand. The town situated on the northern extremity of the shallow bay is evidently declining in size and prosperity. Its trade has been no doubt destroyed by its proximity to Kurrachee, the fishermen even are abandoning their pursuits for more profitable employment in the latter place.

The harbour is roomy, with two creeks on the western side; but there is no protection for large vessels, the entrance being closed by a mud and sand bar, running from near the mouth of the Vindoor to the sand banks on the western side.

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* Salt and sandy desert land.

Water is scarce and brackish, and the wells as described by Arrian become unfit for use after a few days' working. Seven miles N.W. of the town is a large lake or lagoon, supplied probably in some way by one of the branches of the Poorally river. Its bed is composed apparently of marine silt, and covered like all the country between it and the sea, with small marine and fresh water shells. It is a fine sheet of water, several miles in extent, but salt and unfit for any purpose, either of drinking or cultivation. So destructive indeed to every kind of vegetation is the salt nature of the soil about here, that even the Lanee and other most common description of camel fodder plants, which spring up after a little rain, become at once pulpified and spread over the land like patches of dirty cotton cloth.

Again, for nearly thirty miles west, the road lies mainly over drifting sand hills, or low lands, on which the sea at times encroaches. There is some Mangrove jungle, bordering the most northerly creek, which runs inland for many miles in a north-westerly direction from the bay, but the tree is very stunted, and only used for firewood.

Owing to this creek, and the occasional bursting of some of the bunded branches of the Poorally River, over the low salt land, thereby creating a vast swamp near the sea, the coast line has to be here abandoned until we reach "Chur." Here a range of hills (the lesser Hala), probably a spur from the great Jhalawan ridge, strikes S.S.W., but on nearing the sea gets as it were thrown back on itself, and runs for some distance nearly due west. Immediately under this lies the road, until we turn off to the valley of Phor. At some distance, this range looks like a series of disrupted conical masses, with lamina consisting of grey clay, and ochre beds, and occasionally a tinge of red, as if a deposit from feruginous waters. On nearer view the whole is found capped with a dark, loose-grained sandstone, and conglomerate, consisting chiefly of calcareous pits and marine shells of the current era.

At the back of these hills, and forming the northern boundary of the Phor Valley, is the greater Hala range, commencing nearly at a right angle with the lesser, and apparently of a similar composition. Between the two, and just from a point at which, looking from the encamping ground the ranges appear to so converge as almost to meet, commence the Shor hills, the first of a series of remarkable white ridges, that stud and disfigure the entire face of the country.

They appear to crop out of the earth at every turn, and run down close to the sea. In elevation they never exceed five hundred feet, the sides look like a jumble of irregular cones, sometimes filled up by water action, but often leaving caverns, lighted at intervals by rays transmitted through fissures in the irregularly joined pyramids. I walked erect for some distance in one of those caves until stopped by water, clear as crystal, but of nauseous taste. Whitish marl clay seems to enter largely into their composition, and gypsum in laminated masses, and fibres may be picked up in abundance.

Over the top of some is scattered quantities of light and loose grey sandstone, having no real connection with the hills, and appearing as if sprinkled on with the hand. The first ridge runs a pretty regular course between the Hala Mountains, and ends in some masses of low fungoid-looking excrescences in a valley some miles to the east of Ras-Malan. About seven miles from Phor, and in a south-westerly direction, we meet the mud volcanoes or springs of "Hookee." These, three in number, are situated close together, two indeed connected by a curtain of earth, about twenty feet in extent, and of similar composition and colour. They are distant from the sea about a couple of miles.

Of considerable height and conical shape, they can be seen from eight to ten miles off, and from their symmetry and apparent regularity of structure, resemble artificial mounds of white material, with a few feet of dark discoloured top. On nearer survey, we find the sides not at all even or rounded but deeply fissured, and presenting grotesque and fantastic shapes most nearly resembling a huge collection of alligators piled together. Access to the highest (about 350 feet) is easy, except near the crater, where the path becomes slippery. At the summit is a basin of circular form about forty feet in diameter. Within this the liquid mud is heaved up at irregular intervals, and in quantities varying, during the time of our visit, from a mere bubble to jets of a foot high, and two or three in circumference.

Sometimes the action is quite spasmodic, three or four jets following each other, in quick succession, with a corresponding interval of rest. The mud eventually runs over and down the sides in a glistening stream. In a second, of lower elevation, probably about one hundred and eighty feet high, the mud is much more liquid, the action more regular and continued, and a good deal of water is formed on the settling of the eruption.

The temperature was the same, as the earth and water in the locality, and the taste of the brine formed on the subsidence of the mud, salt and nauseous to immediate sickening.

In the action, as well as cause of those springs, there is much ground for curious and puzzling study. Gypsum and sulphur are found abundantly, and may be met in a free state here, and amongst the Shor hills before alluded to: there is also apparently a sulphurous taste in the water, but the absence of any rise in temperature, their course of action (to be afterwards mentioned), and the fact that no particular properties are attached to them, which is invariably the case in the east, seem opposed to the idea of their being of sulphurous origin. Two interesting features deserve notice: 1st. It would appear that when the hills have attained a certain altitude, the action of the volcano ceases. Such might be readily inferred from the sluggish motion now going on in the highest at Hookee, and from the fact that we found none in the line of Shor hills just mentioned, as varying between three and five hundred feet in height, and where at one time a great volcano is said to have been. Again, and subsequently visiting another of greater elevation, and with a circumference of base of a quarter of a mile, situated about ten miles to the North of Hoormara, the mud in the crater was seen, almost entirely quiescent, and had sunk fully eight feet below the crest; while from the side, and at about fifty feet above the surface, there was oozing on to the plain a good stream of liquid mud. 2nd. The people of the country say that the full action is periodic, and reaches its greatest force at the time of spring-tides; in fact, that they are wholly connected with the ocean, and, like it, influenced by the moon. Hence their Belooch name *Dherya Chium* (eye of the sea). From observation, it is evident by the shape of the pyramids, that the mud overflows in great quantities at times, and as we have seen, there are intervals of comparative rest, but no opportunity offered of personally testing their periodicity of action in connection with the tides.

With little to engross their attention in this wild and desolate land, the people are keen observers of natural phenomena, and having all their ideas centered in the sea, are watchful of what changes they consider effected by it; but, again, it must be admitted they are highly imaginative regarding its powers. However, the explanation was given by a very intelligent young man who accompanied us from Sonmiyanee, and afterwards repeated at Hoormara, by an old and respectable Moolah.

The mythical cause assigned is, that it is a deity who speaks, and Monday is generally the favourite day.

They are known as the Khoops of Raja Ramchunder, and accepted as the residence of a Hindoo divinity; are held in great veneration by the pilgrims to Hinglaj, a visit to them constituting the first stage of solemnity in the pilgrimage.

A few miles to the south of Hookee is Katchari, a small bay with a west and northern border of solid red sandstone, and being little liable to change, might be identified as the Kokala of Arrian.

From this to the Hingol river, about twenty-five miles, the road is dreary and uninteresting, lying across the dry beds of streams from the mountains on the right. One with singularly steep banks, and over salt and waste lands often destitute for miles of even a particle of vegetation, and where no animated thing, not even a bird, is to be seen.

On rounding to the left, a hill of loose grained sandstone and clay, the valley of the Aghor opens all at once with a magnificent view of the Nanee and other Hinglaj hills in the back ground. The varied coloured clays of which they are composed, and the regular striation in arrangements, is, when seen through the ravine, from which the river emerges, a grand distraction on a weary journey. Running a very serpentine course to the sea, the Hingol is at all points fordable, and the water good. Near the left bank are the ruins of an old town, and in the centre of its bed the remains of a fort, and well built, it is said during the Hindoo dynasty, for the protection of the pilgrims to Hinglaj against the pirates, who infested the coast. But more likely for the protection of the town, as the river during the season of the pilgrimage is not navigable, and unless circumstances have sadly changed, the condition of these poor pilgrims could have offered little to excite the cupidity of pirate or robber. The soil here is quite a barren salt, and sandy loam, incapable of cultivation. The river corresponds well with the Tomerus of Arrian. Bounding the valley on the west, is a series of low ridges, seven in number, striking north and south, and dipping with great regularity westward. They vary from sixty to one hundred and fifty feet in height, and their incline towards the plain eastward is more gradual and regular than any hitherto met with, but their composition the same.

On looking at them from the Aghor, they appear to run together towards the south, and to be blocked up by the white (Shor) hills; but

on subsequently visiting them from the sea we found intervening passages, valleys indeed they might be called, open right down to the eastern extremity of the Malan, studded however with the low white mounds now so general. Through these, in an opening cut by the river, the road lies, then turns north under the Nanee hills and highlands, either the terminal points of, or spurs from, the great Hala range.

These continue to the coast, and form the natural western boundary of Lus. They attain a considerable height, probably from twelve to fifteen hundred feet, and are composed of layers of beautifully-coloured clays of grey, yellow, and purple, capped with a dark brownish sandstone.

After a zigzag course of about seven miles, the river is joined at an easterly angle by the stream from Hinglaj. Turning to the left, and through the bed of this latter, lies the way to the temple, the resort of thousands annually.

It is a small mud building in a natural recess of one of the high rocks. A few pools of fresh, clear water are near, filled with tame fish, whose wants are carefully attended to by the pilgrims. Several kinds of oleander, amongst which are, the larger pink, and a poisonous variety so well known to camel-owners in the hill districts in Sind, and to travellers in the Moolla Pass. There were also some willow-trees, and the water was studded in parts with bulrushes.

The pools are supplied by a little rivulet trickling through the stones, but after rain this must suddenly increase to a grand bounding torrent. It is a fine ravine, the rocks sometimes attaining a nearly perpendicular height of fifteen or eighteen hundred feet.

On returning about two miles, we again rejoin the road and proceed north, crossing the river nearly a dozen times in a distance of about as many miles, and at last gaining its right and western banks, leave it at a place called Hurrian.

The Hingol is a fine perennial stream with a pebbly bottom, rises probably somewhere near the valley of Mashkee, and flows undoubtedly through it, or some country in which the date-palm flourishes, as the banks are covered with the roots, leaves, and decayed stems of these trees, brought down during different inundations. Skirting its edges, there are patches of jungle, chiefly Babul and Tamarisk, with occasionally some poplar-trees.

Along its left bank, for five or six miles south of Hurrian, are seen the ends of a number of parallel ridges, striking pretty regularly S.S.W.

One of these, the Jogan, appears to rise abruptly out of the river as you approach. It is about fourteen hundred feet high, the lamina nearly a horizontal, and composed of variously coloured clays.

On the right bank, and between it and the beach at Hoormara, a distance of over fifty miles, in a south easterly line, the whole face of the country is one mass of those white (Shor) hills, so often alluded to. Springing up in every conceivable place and position, they are devoid of any regularity in shape, size or direction. The road is merely a repetition of tortuous windings over and through those, or sometimes in the beds of streams formed by the rain running off, and among the hills. As might be imagined from the nature of the soil, the long lodgment of rain, and absence of anything like a water-shed, those Nullahs abound in quicksands.

It is indeed the worst possible road. Impassable after much rain from the narrowness of the pathway, its liability to be turned into a water course, or completely blocked up by the disintegration of those easily soluble clay peaks. Again, equally impassable after a very dry season; for although evaporation is slight so near the sea, and the pools are in well-shaded places, yet they will dry up, as we experienced in one instance, where a good supply had been reported, but we found all nearly evaporated away or soaked up and insufficient, for a third of the camp.

Judging from the soil, its salt and sulphurous nature, a well would require to be dug very deep before wholesome or drinkable water could be procured.

Leaving those hills, and crossing the Gorund river, we reach Hoormara, about eighteen miles by beach from the Malan, and thirty-five from the mouth of the Hingol river, the starting point four marches previously.

This village is a mere collection of mat-huts under a curious rising ground, 400 feet high, and composed of grey and yellow clays, capped with sandstone and loose conglomerate.

At some distance off, it rises as it were from the sea, and in its great regularity resembles an artificial pier. About three miles long, there is a considerable incline on its south or sea aspect, and a fine bay at its east and west extremities.

Looking from the eastern extremity, Ras-Malan is seen in a direct line, and of about the same altitude, the harbour running in between the two. Again, passing a line from the western end across the bay, the

hill might be connected with Ras-Senee, now wasted away to a mere low-lying ridge. In all probability they are but the remains of a line of hills once abutting the sea on its western coast. That Oremarrah rock (Ras-Arubah) is gradually wasting away, we had strong proof while encamped there, in witnessing the operation of a few days' monsoon on its loose material.

The people, a fine hardy race of fishermen, much the same as at Sonmiyanee, with a considerable admixture of African blood, are civil and hospitable.

Owing no doubt to the regularity and healthy nature of their pursuits, the men vastly excel in physique the natives of India, and most of the women are handsome, with nothing remarkable in their dress, but a decided predilection for gaudy colours and a black net veil, which they wear thrown back over the head and shoulders, but never to cover the face, a practice amongst them wholly eschewed. It is the only place with inhabitants in Mekran, subject to the Jam of Beyla, a chief for whom they appear to cherish a great affection.

His rule seems mild and unoppressive, and his people, if denied wealth, are certainly in the enjoyment of happy contentment. The valley of Chalnor is only distant about five marches in a north-westerly direction, and is said to be very fertile.

From this to Kurmut, the road again lies for seventy miles over low land and swamps, chiefly salt, but often with a sandy loam capable of cultivation after rain.

The hills appear to take a more westerly strike. There is some Mangrove jungle near the coast, and a few Babul and Kendi trees, but the feeling of barrenness prevails throughout. A creek runs inland some distance, receiving two or tree mountain streams.

Between it and the sea is the old fort of Kurmut, with a few wells, and some date-trees. Not many miles further on, the country becomes again blocked up by the Shor hills, dotted about as before, of various heights and sizes, but leaving no outlet or passage amongst them.

The road now lies along the beach, often impassable at high water, the hills continuing to run down to the sea for fifteen miles into Passeenoe, a village on the Shadee Khore river, and consisting of a few mat-huts, and a small enclosed fort, within which Behram Khan, chief of the Kurmutties, resides.

Situated on a good river, and within three days' communication of the richest valley in Mekran, it might be a place of importance, but for the blighting influence of Faqueer Mahomed, Naib of Kedge, whose rule partakes more of the unpitying robber chief, than of the legitimate governor.

About seven miles south-east of Passeenoe is the Island of Astola, a strip of land, rising as it were out of the sea, and probably four or five miles long.

It is a place of great Hindoo veneration, and abounds in turtle, the Arabs from Muscat and the Battnah coast often crossing over to catch them.

Six miles due south of the town is another of those remarkable highlands noticed at the Malan and Hoormara, but much more worn and fast wasting away.

From Passeenoe to Gwadel, the country assumes a somewhat more cheerful aspect, though all near the sea is still a swamp or waste. Salt lands there are inland, some few small groves of date-trees with earthen embankments to retain the rain waters, and one or two trifling patches of grain cultivation. The hills appear to strike still more westerly, and leave a greater extent of open plain.

On nearing the beach, within about eighteen miles of Gwadel, there is a descent of fifteen or twenty feet into an extraordinary looking valley, studded with small white (Shor) hillocks from five to thirty feet high, and appearing like a large basin or bowl from which the sea had receded. From this the road lies close along the bay, with some curious-looking clay peaks on the right, into the town. Built like Hoormara on a narrow tongue of land, with a bay east and west, it has also like it a highland south of lesser elevation, but greater superficial extent, being considerably wider, and a couple of miles longer.

It is composed of grey clay and conglomerate, often of shells of an enormous size, and masses of tree coral, the whole capped as usual with sun-baked sandstone.

On the top are the remains of a well-built tank, with some defences supposed to have been by the Portuguese, and a few fresh water pools. In the season melons are extensively cultivated, and grass grows abundantly after rain,—the liquorice plant may be also found wild here. The town belongs to the Imaum of Muscat, who maintains a governor and a few sepoys in it, but the people are nearly all Belooch. A brisk business appears to be going forward. Export goods, chiefly fruit (date)

and a little cloth are brought from Kedge and Punjgoor. A number of Hindoo and Khojah merchants have settled, and carry on the trade of the place. As at Hoormara and Passeenoe, the "Pish," a species of fan-palm, provides all the women and children with employment, and at every hut door, one or more will be always found busy making mats for the walls and roofs of their houses, or for bags to store dates and fruit in, or as an article of export to Bombay. From it they make their sandals, and the only rope in general use are of this material. The leaves when moistened in the sea-water, split and divide easily, and may be at once worked.

Nearly all the heavy work is done by slaves, who, not being so free to come and go as at Hoormara, and, being unlike the latter place, under some restrictions about going to sea, are less contented, and two or three entreated to be brought on board and taken to Kurrachee.

But, on the whole, slavery is now merely nominal along this coast. Facility of flight in the various Bombay and Malabar boats, and the certainty of a good reception amongst a colony of their friends settled at Kurrachee, with plenty of work there, impels the slave to run on the smallest provocation, while the difficulty of capture, and knowledge of the detestation in which the system is held, deters the master from pursuit.

Gwadel has an old fort with high walls, within which the traders send all their wealth at night, through fear of a raid from Kedge or the highlands outside. A few rusty guns, useless if not dangerous, are mounted for defence. Mat-huts constitute the remainder of the town, and in the small plain some date-trees, with four or five banyan and almond-trees, grow. There is a good supply of excellent drinking water within twenty yards of the sea, but close up under the high ground, the water is somewhat brackish.

To say anything positive regarding climate would be, from such little experience, premature. From the twelfth until the end of January we experienced a severe monsoon, with heavy rains; an occurrence, according to report, quite rare. In all other respects the weather was agreeable, never positively cold, and always with a great uniformity of temperature both by day and night. The variation in the thermometer was always trifling, and the average in the registry of six weeks 65°.

Regarding the highland at Gwadel it bears the reputation, and I should think justly, of enjoying throughout the year a delightful

climate. It can never be oppressive, as during the hot season it must be tempered by the strong south and south-west sea-breeze, to which it is fully and openly exposed.

Having subsequently had the good fortune to re-visit most of the places mentioned in the foregoing report from the sea there offered a better opportunity of fixing their geographical position, and of establishing some identity between the prominent points now actually found, and those mentioned by the Greek historians of Alexander and Nearchus. But I must confess myself equal only to a mere outline of the task, and venture to hope that Major Goldsmid, with his great resources of literary talent and observation, may be yet able to devote some attention to this interesting subject.

Between Kurrachee and the Poorally river, called by Arrian the Arabis bay, the country of the Arabii, a people accepted as Indians. Along this coast line are still many recognizable points, as Cape Monze for "Eirus," and Chilney Island for "Bibacta." Regarding the commodious harbour between the two honored by the name of Alexander, there is hardly a trace remaining. Indeed, the author must have been under a misapprehension, or the face of the country has wonderfully changed, for he says "the fleet was here disembarked, and a camp formed on shore, where the men suffered dreadfully from brackish water." Now, in truth, the river Hab empties itself here, and its mouth forms the only bay that is, with water of the purest and most excellent quality.

The diminished size of Chilney, and total disappearance of another island south-east of it, are explainable on the generally received belief that the bed of this ocean is subsiding. In the small bay close to the present Bedook pass, we might recognise Sangada, for there is still protection for small vessels there, and mention is made of pirates at this particular spot. It may be pointed out that no better hiding ground could be had, if particularly we may only assume that the present great ravine, with its banks from forty to fifty feet high, was then an inland creek.

West of this, several small islands, and one large one "Domæ" under which the fleet took refuge, have disappeared; and the two remarkable rocks, in passing between which "the oars touched on either side," are not to be found. There is a sandstone rock to the west of the Bedook that might correspond to one, the second we are obliged to take for granted, has subsided.

In pursuing our course still westward, the place mentioned as Moron-tobara (the port of women) ; and described as "a harbour with a narrow entrance, safe, and capricious, landlocked all round, and protected from the wind in every quarter," is certainly Sonmiyanee bay. Consideringt he course necessarily followed by Nearchus, the comparison of distance would alone establish the identity. But, in addition, every particular in the sketch answers exactly with the exception of "narrow entrance." This, however, may have readily altered ; and we know there is now a great bar running across the mouth, and often dry in parts at low water.

That it was a large and well recognised harbour is evident, as Dr. Vincent remarks, from the fact that it is the only one on this coast retained by other writers, as Ptolemy and Marcian of Heraclea.

Continuing the voyage the identification becomes even more satisfactory, "they then proceeded to the river Arabis : having an island on the left, and the main on their right.* The passage through this channel was more than four miles, but so narrow as to appear like a work of art, the island woody, and in a manner overgrown with trees of all sorts."

Referring to mention made in the early part of this report of a creek running west by north, for a considerable distance, from Sonmiyanee bay, there is a little difficulty in recognising the narrow channel through which the Greeks passed to gain the mouth of the Arabis. The land on the left is still covered with thick mangrove jungle, and the Poorally river, though it has long since ceased to flow into the sea, being directed higher up into numerous channels for irrigational purposes, may be now traced at this point, and about nine or ten miles from the present town of Sonmiyanee.

It would appear that at the end of four miles they were stopped by shoal waters, and obliged to wait for the tide to carry them three miles further to the river. This creek is now navigable with the tide to a considerable distance, but does not rejoin the sea westward, as it must have done in the time of Nearchus, becoming lost some thirty miles onward near a place called Phor, and converting into a swampy peninsula what the Greeks found an island. Between this last river and the Tomerus, at Cape Malan, lies the country of the "Oritæ." Within these desert limits only the last station can be positively determined. Purra

* Vincent's Arrian.

is mentioned by Arrian, and Parsis by Ptolemy, but with such confusion as renders it impossible to reconcile them into Phor. Katchari, however, we may assume as "Kokala," because at no other place could they with safety have drawn up their boats on this bleak coast. A pass through the N.W. hills leads out near here, and Leonnatus, despatched from the army by Alexander with provisions, joined them at the end of their third day's voyage, which would be this spot.* The concurrent facts all seem to establish the identity of Katchari with "Kokala."

Alexander, finding the coast line so barren, appears to have started north from Sonmiyanee, propably by Lyari, crossed the Arabis (Poorally), and marched towards the valleys of Jhow and Kolwah, having first divided his army into three divisions under three generals, in order more effectually to plunder the country, as Quintus Curtius quaintly relates. In this manner they ravaged *India* in three distinct bodies and carried off great booty. Ptolemy wasted the maritime country; the king destroyed the midland part, and Leonnatus the rest." The booty, however, cannot have lain in provisions, for about this time half the army perished of starvation.

Returning to Nearchus. He landed his crew at the mouth of the Tomerus (now Hingol) river, attacked, probably in the Aghor valley, and defeated the natives, whom he describes as a savage race, living entirely on fish, dried in the sun, and torn with their nails. "They
[illegible] [illegible]ir nails or cut their hair, and were clad in the skins
[illegible] were low, and built entirely of the bones and skins
[illegible]

[illegible] of clothing, this description might exactly
[illegible] [illegible]long this coast. They feed themselves and
[illegible] so that the mutton, fowls, and even eggs,
[illegible]

[illegible] the Oritæ is also the natural one of the
[illegible] of somewhat eliptical shape and small
[illegible] by the Hab river, north by the mountain,†
[illegible], west by the Great Hala range ending
[illegible] the Indian Ocean.

[illegible] [illegible]st, with the Pubb hills.

A great mistake in the maps assigns its southern boundary as Sonmiyanee bay, whilst its greatest extent is from that bay west to Cape Malan.

From this to Cape Jask, the country of the Icthyophagi and of modern Mekran, there are many places traceable as those treated of by Arrian.

The first, Malan for Malana, preserves its name nearly intact, and Hoormara answers to Arubah.

He says they landed here and proceeded four miles inland, where there was a town and good water (the name Pasera), while at Hoormara the people pointed out a place where was said to have been the ruins of a former town. None however are now discoverable, with the most diligent search, but the only good water to be had is still procurable there. Next Dr. Vincent recognises Kurmut and the Island of Astola as the Kalama, and Karnine of the Greek historian, and being so well-fixed, there cannot be much mistake about them. But Passeenoe appears to have been passed and left unvisited by the fleet.

Indeed, there may not have been a village there, the whole of the coast from the remotest ages to very late years having been subject to the visits of pirates, for as we know Sonmiyanee was plundered as late as 1808, and Passeenoe destroyed in 1809 by the Joasmees, whose head quarters are at Shaijab on the pirate coast. Nearchus appears to have sailed by the East bay, and "doubling a cape that stretched nine miles into the sea, anchored in a safe harbour called Mosarna." This has totally disappeared at the present day, but with it has gone also the highland (as mentioned in the report on Passeenoe), and we are thus left sufficient grounds to infer, that Cape Passeenoe, like Hoormara and Gwadel, once had its two bays, and that the west one then afforded protection to the Greek ships. It is a place of some importance, as Ptolemy mentions it as the seaward termination of the boundary line between Gedrosia and Karmania, countries through which Alexander marched. They no doubt laboured under the mistake that the hills ran down to the seaside as more modern writers have done. Gedrosia, I presume, included all the upper country westward of Cholnar, as Kedge and Punjgoor, and was very fertile. Quintus Curtius says.—"Then they came to the country of the Gedrosia, where they found abundance of all things." Karmania again embraced Bunpore and onwards, after which the army knew no want.

At Mosarna we must take leave of the fleet for the present, for here they got a pilot, and made such long daily voyages that in this hurried sketch we are unable to follow them, but hope yet to do so. Every thing mentioned may be still found along this coast. Sharks abound, and the whale I have seen both near Gwadel and at Muscat. Oysters and muscles are well known, and a "large description" of shell fish, particularized by Arrian, is well represented in a shell (cockle) I found on the top of the hill at Gwadel, and now in the Museum at Kurrachee. It is more than ten inches in diamater, and about seven to nine pounds weight, and this only the single shell.

Since writing on the mud springs of "Hookee" and "Hoormara," I have received from Dr. Haines at Bombay, an analysis of two bottles of water and liquid mud, forwarded by me to him.

2. From this it appears the constitution of each is somewhat different, the account I beg to subjoin as follows:—

Analysis of Bottle No. I. from Khoop, 180 feet high at *Hookee*:—

Specific *gravity* at 60° F.; 1099·03-alkaline 1,000 grain measures, evaporated to dryness, leaves solids 14·096 grains.

Found in 1000 grains—

Chloride of Sodium	118·686
Carbonate of Soda	20·236
Sulphate of Soda	·974
Chloriate of Potassium	·100
Carbonate of Lime	·075
Carbonate of Magnesia	·055
Silica	·040
Total solids	140·166
Sulphuretted Hydrogen Gas	·053

3. Bottle No. II. was mud taken from a jet fifty feet above the surface of the ground in the side of a "Khoop" at Hoormara, nearly seventy miles further westward, and about ten, instead of two, from the sea. The height of this, it will be recollected, was between four and five hundred feet, and the liquid in the crater *all* but quiescent.

4. Specific gravity of water in No. II. 1011·4 *neutral.* This was some water from the settling of the mud by the time it reached Bombay. "The mud is chiefly finely divided by Carbonate of Lime, with a little dark coloured clay." Dr. Haines adds, likewise, that the water is of a most interesting nature, and contains a very "decided impregnation of Iodine, a circumstance most unusual," but that a further quantity is required, which may be obtained during the next season of the Hindoo pilgrimage; for seldom, if ever else indeed, is a visitor seen on this dreary and truly "inauspicious coast."

5. The heaving up of the mud he attributes to gaseous influence, and it would be highly interesting and satisfactory, as he says, if some of this could be collected at the "Khoops."

ART. XV.—*Short Notes on Japan.* By Lieutenant G. T. ROBINSON, H.M.I.N.

LEAVING Kanagawa at 10 A.M. of the 4th August, we pursued our course in a W.S. Westerly direction. Our attendants were numerous, the Vice-Governor of Yeddow was charged with our safe custody. The road from Kanagawa is the "King's Road," well kept and lined on either side with magnificent trees of the fir and cedar, so abundant in Japan. The country would require an abler pen than mine to do it justice, hill and dale, mountain and valley, succeeded each other at every turn and winding of the road; busy villages, with their fat, healthy, and good-tempered inhabitants; the entire absence of anything like "*waste lands*" revealed a country, at once populous and highly cultivated, and a people smiling and prosperous. Our journey had been planned to allow us ample rest (and as it is considered the sign of vulgarity to "gallop" in Japan, our sure-footed galloways were kept at an easy amble); and divided into three portions; the first from Kanagawa to Harconee, on the shores of a lake of that name, from Harconee to the base of the cone of Fusi Yama on horseback; and from Hushimondo to the top of the mountain on foot. Our first stage was to Sotsaka, and through the royal domain, in which it is forbidden to shoot, the game being strictly preserved; the infringement of which law by an English resident, has given rise to some very unpleasant litigation. Passing through Fassima, Hilatski, Orsa, Odawarra, Yamata, we arrive at Harconee 17 Rea* 12 Skets, or about 61 miles from Kanagawa. I found the altitude of the lake to be 6,250 feet, and the ascent to it so steep up the Harconee mountains from Odawarra, that we had to dismount and lead our horses up the abrupt, though well-made, mountain road. At Odawarra we crossed the Sackawagna river, a broad stream, in barrows carried on men's shoulders. The Harconee lake cuts through the boundary of the Royal or Crown lands, and to prevent smuggling across the border, boats on this picturesque lake are forbidden. I was thus unable to sound its depth, being too much afraid of cramp to venture on a swim to its centre. I was enabled, however, to measure

* The Rea = 36 Skets.
" " = 2¼ English miles.

parts of its shores, and estimate its mean width at 1,500 yards, and its length some three miles. It is enclosed by the high peaks of the Harconee range, and its depth must be considerable; the weather was wet and cloudy, and I was unable to fix its position or determine the variation of compass.

From Harconee our way lay through Mussnud, Numadso, Hallah, Yosiwalia, Orino, Murigona, to Hushimondo about 80 miles, still along a well-made wide road, bordered with trees ranging from 10 to 17 and 24 feet in circumference. From Harconee there had been a gradual descent of the land face of the mountains of that name, across numerous streams of varying breadth and strength (though few of a size to be navigable except by small boats) to Halla, from whence the country gradually rises to the base of the cone of Fusi Yama; at Murrijama we halted for the night (as we had done at several other stages), when I ascertained the height above the sea level to be 4,100 feet,—the sea shut out from view by the Harconee hills before alluded to.

From Hushimondo we started on foot, armed with light piece Alpinstocks to scale the face of the cone, rising at an angle of 35 degrees; the ascent was most laborious over loose Scoria. At every half rea, or about 1½ miles, there stands a rest-house, where tea and other light and agreeable refreshments are procured by the pilgrims, at the ninth rest-house we halted for the night, some 8,000 feet above sea level.

Trees had ceased, and we found the cold rather more than we could comfortably enjoy. The morning found us above the clouds, wrapped in ice and snow that melted before the rising sun. Facing the hill side we pushed on; at 12,000 feet vegetation ceased, giving place to the snow drift; and at 13,977 feet above the level of the sea, we had planted the first European foot on the crater of the Haly mountains of Japan. The day was glorious, clear, and fine; and exhibited a panorama the like of which poor I shall never see again. With the aid of a spy-glass we made out the ships in Kanagawa Bay upward of 100 miles distant, and the whole kingdom in its beauty lay smiling at our feet. The air was so rarified that we found it difficult to advance more than a few paces at a time. True to our instincts, we unfurled the British Union (Indian Navy one) Jack, fired a Royal Salute from our revolvers, sang "God save the Queen," gave three British cheers, and drank her health in champagne to the intense satisfaction of our Japanese friends, who evidently regarded our proceedings as a high religious ceremony.

Having acquitted ourselves as true and loyal Britons, I proceeded to take observations; and had the good fortune to secure them for latitude and longitude by artificial horizon and chronometer, and for variation by Azimuth compass, all of which instruments had been safely brought up by the hill coolies; the time of day and rest after our ascent enabled me to secure good observations, the results of which are as follows:—

Height of the edge of the Crater	13,977	feet
Ditto of highest Peak	14,171	„
Length of Crater	1,114	yards
Breadth of ditto	666	„
Circumference which agrees with the Japanese measurement, they having to perform its circuit in the pilgrimages	2½	Nautical miles.
Depth of Crater	500	feet
Latitude of Temple or rest-house on top	35°21′	N.
Longitude do do	138°42′	E.
Variation of Compass	3°2′	W.
Temperature of Air in sun at noon	54°	Fah.
Boiling point of Water	186°	Fah.

Leaving the mountain top we made for Atami, a place some few miles outside the Bay of Yeddow, and celebrated for its intermittant thermal springs; the waters are sulphurous, and issue from the rocks near the beach at a temperature far above the boiling point, intermitting four times in the 24 hours. The roar of their discharge can be heard for miles round the country, and the vapour rises like a dense white cloud visible many miles to seaward. There is no anchorage off Atami, and the "Berenice" was forced to anchor in a neighbouring Bay, having come round to pick the party up; and alas! the "Camilla" was no more, having foundered in one of those terrible cyclones that render the Coast of Japan a terror to Navigators at this season of the year. On our route I recognised the pine, oak, maple, beech, lime, alder, chestnut, apple, pear, peach, waxtree, tea, bamboo, orange, camphor, cherries, cotton, figs, grapes, walnut, rice (2 kinds), millet, (3 kinds), sweet potatoe, egg plant, Indian corn, beans in variety, peas, carrots, turnips, onions, pumpkins, tobacco, sugarcane; in fact, I should say that Flora holds a year long jubilee, and Ceres a daily feast in the golden islands of Japan. Coal is in abundance—the authorities are reluctant to give information as to which are the mining

districts—all the islands produce it; as yet it is only surface coal, and of a quality far superior to Burdwan, and very cheap; one Dollar for about 3 cwt. The islands are volcanic and subject to frequent earthquakes, so much so, that the houses are constructed of wood, and the fortifications, which are extensive and highly scientific, are built of huge slabs of stone and without mortar. On the northern island, and about Hakodadi, the potatoe and hop grow in abundance. Near Hakodadi are several considerable active volcanoes, from whence sulphur in large quantities is procured, and the island of Vires at the entrance of the Bay of Yeddow is in full play. Gold, iron, copper in large quantities, and silver, are also among the mineral products.

The people of Japan are civil and good tempered; and as far as I could judge, the rows and disturbances we read of, are brought on by the misconduct of foreigners resident in and visiting the seaport towns. The Eastern shore of the Bay of Yeddow is yet unsurveyed. I found good anchorages behind the islands marked as Saka Sima, and Youka Sima in 6 fathoms mud, shut in from N.N.W. round to West, Saka Sima W. ¼, N. 1¼ miles.

The coast from Son Saki to Cape King is very incorrect; from Sirako to Kako Jama (Oosigassi Saki on the chart) I obtained 25 to 15 fathoms close in shore; between Cape Tamietsi and Singa Saki I obtained from 20 to 10 fathoms, sandy bottom. The line of coast was much out, and having native pilots saw the folly of giving "fancy" names to headlands and capes, for few of the names given on the Chart were recognized; and I trust that the able officers who are now endeavouring to effect a survey of the coast, will follow the example of the Surveyors of the Indian Navy, and give the *Native* names to their discoveries; and it would help future Navigators, if the names were inserted in the Native as well as in English character. The whole coast was alive with fishing-boats. From Oosima up the Kino channel the coast is unknown, and out in longitude from Sira Saki North and N. E. to Oozaka; the coast is very much out; the straits on the East side of Avasi Sima safe, and well fortified; regular soundings from the straits to Oozaki from 25°, 18, 11, 10, 9, 4, to 3¼ and 2¼ fathoms, where I grounded in soft mud close to the beach.

Fioka is under the point marked Cape Avodine, 5 to 7 fathoms mud, open to the E.N.E. The Sinanoda Sea is a most wonderful place, and consists of a rapid succession of lakes and channels of all sizes and depths, now in the ship's own draught, and a mile farther off no bottom with 100 fathoms of line; at one place I ran into anchor, I got 50 fathoms,

no bottom, my jibboom was poking into a house window, and I had no room to turn the ship, had to back out and run for seven hours before I found a resting place for my "mud hook:" in about longitude 134° E. another channel out of this inland sea exists, not laid down in the Chart. The water traffic is very great, and the towns on the shores are numerous and well fortified: cultivation is carried up to the hill top; vast quarries of stone exist. The dangers and rocks are marked with well-built beacons that would shame Bombay with her wretched attempts; the customs officials numerous, vigilant, clean, and civil. I did not land "*en route*," as it was contrary to the wishes of the Government; and, offence had been already offered them by some silly people who were allowed to land from one of the Bengal transports. The current runs with a "whirl" through some of the narrow channels, the old "Berenice" was more than once spun round like a teetotum, and a screw steamer with her two transports in tow were nearly coming to grief. In latitude 34° N. and longitude 135° 03′ E. I found shelter in a secure cove or inlet, called by the pilots Kisu-urano-utsa, during a heavy cyclone which lasted for two days, and but for the friendly "cove" the "Berenice" and her crew would have gone to "Davy Jones," and ground to powder on the iron coast. The winds that prevail on the East Coast of Japan are:—

January to May.....	West and N. West.
May	Variable.
June to August	East to E. N., E. and sometimes S. East.
September to December.....	West and N. West.

October is a bad month for navigation; and from the middle of August to the middle of October is the worst season for cyclones, which blow with great fury, and give but little warning: from December to June the climate is delightful, clear, cool, and bracing; and at Hakodadi the snow lies foot deep on the ground. The mean range of the barometer throughout the year is from 29·70 to 30·06, falling to 27·50 in the cyclones. The range of the Thermometer—

Mean 26° to 70°
Extreme 14° to 74° } Fahrenheit.

The Russians have extended their possessions on the coast of the from the Amoor to the parallel of Hakodadi, which they their winter quarters; the northern half of Saghalin, with its ds of coal and mineral ores, has fallen to their share, whilst

the shipwright and the armourer ply the busy hammer on the banks of the Amoor and its rapidly increasing arsenals.

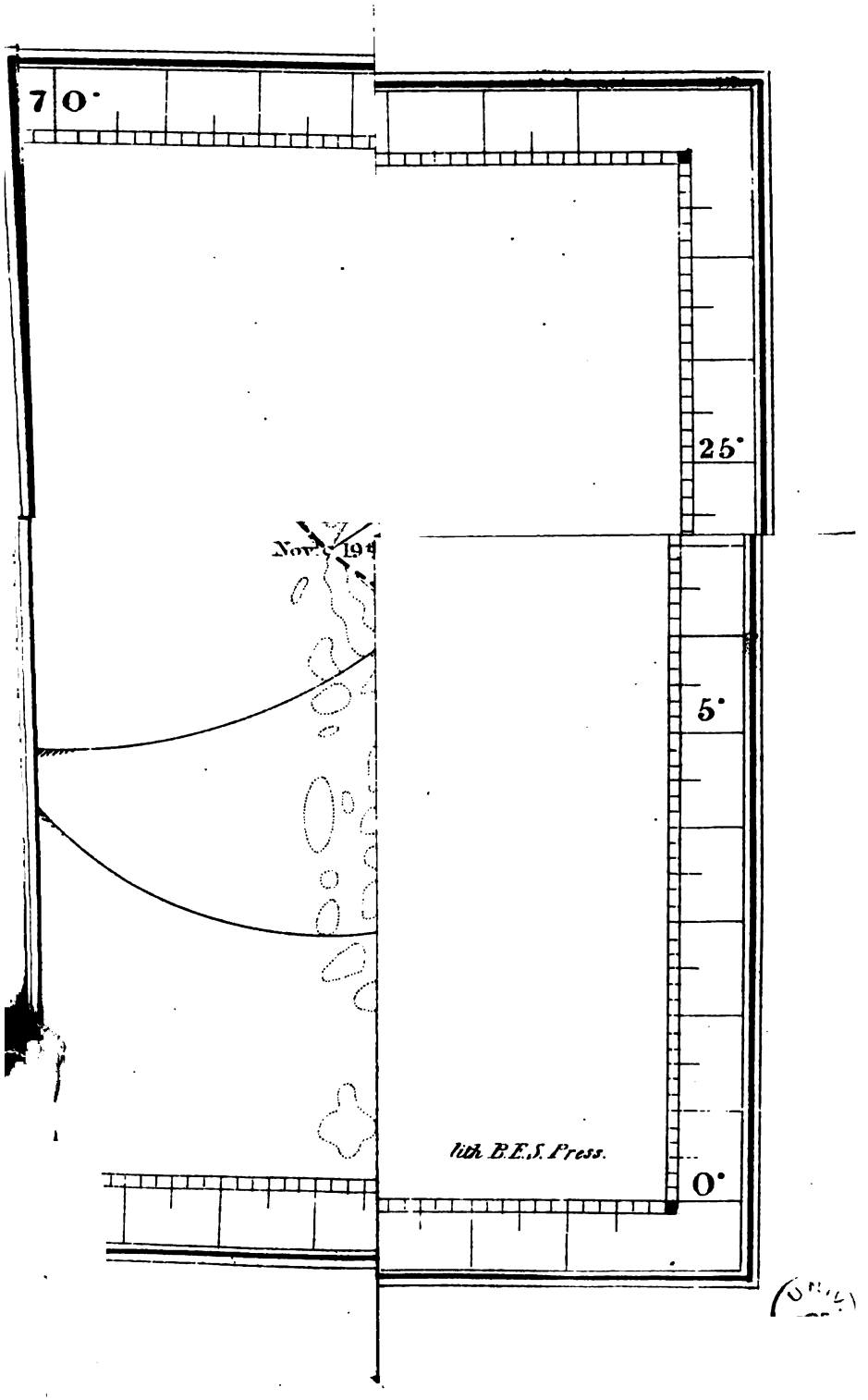
Japan is one of the geographical wonders of the world; and its teeming millions, with their quaint mixture of barbarism and high civilization; its wonderful system of police; the military element so largely diffused; almost a nation of sailors; its proud feudalism, and yet exclusive monarchy, should hardly be left the prey of unprincipled adventurers who call themselves merchants and disgrace the name.

Additional Notes.

"KING'S ROAD."—The Roads in Japan are well kept, and the main road of the empire, or "King's Road," extends to all the principal towns; of the one we traversed, though not macadamized it was a made road, and about 30 to 50 yards wide, and cutting through the towns I have named in my "short notes." There are other or "Part Roads," these also are well kept, and as I coasted along the shores of the islands, could see the mail *en route* from station to station. The wheel carriages are few and for goods' traffic only, strong wooden springless carts, with solid wooden wheels, drawn by cattle shod with straw: pack horses are in general use as well as pack bullocks; the saddles of these pack animals are well made, and very handsomely ornamented with brass and coloured leather. Their drivers seemed to be regularly licensed and very honest, and their services are procurable at all the towns on the road. The "Royal Domain" extends for a considerable distance from Yeddow, and is divided off by boundaries, as are all the different provinces or estates of the nobles. At the entrance of the estates that cross the public road is stationed a guard, always under arms, whose duty it is to examine the passports of travellers, and drive back *any one* who does not possess the authority to travel on that particular road. The guard houses we passed were perfect models, they mount guard as we do: each soldier has his Lord's crest worked into and with the material of his dress. The Dimios showed their civility by sending a guard of honour with an officer of rank to pass us through their gates, and escort us to our next resting place; and very imposing they looked sometimes. Absence of waste lands is remarkable, and the country a perfect garden; their markets well stocked with vegetables and fruits of all descriptions, their carrots, turnips, and onions made up into

The women ornament their hair, the men dress richly but plainly, and all above a certain rank must wear silk: cotton is for the common herd.

The Japanese are by no means a bigotted people, they are open to conviction, seek eagerly for information, and all evince a desire to learn English; and I have no doubt that European literature, translated into their own language, will soon grace their book shelves. The Dutch is the medium of communication now, but they despise the Dutch now they know more of Europe and Europeans, or rather the Anglo-Saxon. I have no doubt but that a transl[illegible] he Bible would be well received. As yet the Missionaries hav[illegible] ng but study the language, and win resp[illegible] 'cem by [illegible] ut walk and conversation, so very differe[illegible] the n[illegible] igu[illegible] Japan. It is contrary to th[illegible] Tre[illegible] and the Missionaries h[illegible] ly in [illegible] nts of the God of Truth, [illegible] they [illegible]; and here, as in many [illegible] Am[illegible], she has her Missiona[illegible] mary[illegible]


70°
25°
5°
0°
lith. B.E.S. Press.

Now, out of the numerous points or stations above quoted, as being out of the influence of the Cyclone at noon of the 21st of November last, we find that the one least distant from its influence, is the ship *Anna Henderson*, which was forty-five miles beyond the radius given to it by the *Shakespeare*. It is, therefore, evident that the boundary line of the Cyclone lies between the limits of the *Shakespeare's* radius and that of the *Anna Henderson*.

Now let us, in order to proceed with this hypothesis, suppose that the limit of the Cyclone was half way or thereabouts between the above positions, or say 25 miles beyond the *Shakespeare's* radius. This gives the distance of the Observatory at Bombay from the circumferential limit of the Cyclone to be ninety miles, and the diameter of the Cyclone to be 450 miles. We must not be astonished at the apparently vast dimension of this Cyclone, for Captain Piddington, who has made the Law of Storms the study of his life, informs us that "Cyclone revolving according to the usual law (as did this one) may be looked for of all sizes, from 50 to 500 or even 1,000 miles in diameter; the very large and very small being comparatively rare, and the small one sudden and severe."

We have thus ascertained, so far as hypothetical reasoning and argument enable us to do, two very important points relative to this Cyclone, namely, the apparent position of its vortex on the 21st of November last, and its probable diameter. It is now my intention to find out the position of its vortex at noon of the 22nd, as that will, with what we already know, give us the direction it was travelling in and the number of miles it was going per hour; and these points being ascertained, will at once serve to test the accuracy of others which we have hitherto only been able to take for granted.

On the 22nd of November last, at noon, we had at Bombay a very fresh, steady breeze from South (I may say due South), with clear weather; this showed by the Law of Storms that the vortex of the Cyclone was due West of Bombay. This, though apparently an unimportant point, is one which will prove a very salient one in our present investigation. The fact of the wind having been due South, ensured its coming to the Anemometer of the Observatory uninterrupted by any terrestrial influence, and consequently it might be relied upon as datum for determining the exact direction in which the vortex of the Cyclone then lay. This, as I before stated, made it due West of us, and I am happy to say, that the data obtained from six ships

then at sea in the gale, place the vortex of the Cyclone on that line. Had the wind, at Bombay at noon of the 22nd of November last, been blowing from an inland or easterly direction, it could not have been reliably used as datum for the Cyclone's position, as the mountains inland greatly influence the wind's direction, and cause it to diverge from its natural or true course.

The position of the Cyclone's vortex at noon of the 22nd of November last was determined from the following data (*vide* Diagram):—

Number on the Diagram.	Vessel's Name.	Latitude North.	Longitude East.	Direction of the Wind, corrected for Variation and Deviation.
14	Good Success	16° 38′	72° 55′	South Westerly.
15	Shakespeare	15 36	71 36	West South-West.
16	Coromandel.....	18 52	72 40	South.
17	Earl of Clare	17 40	72 55	South South-West.
18	Jamsetjee Jeejeebhoy.	17 23	66 48	North North-West.
19	Delhi	18 22	66 10	Northerly.

which place it in latitude 18° 52′ North and longitude 69° 15′ East.

So far, our data have enabled us to establish the position of the Cyclone's vortex on two successive days, and hence we are enabled to state that the Cyclone had travelled 168 miles from noon of the 21st to noon of the 22nd, and therefore its rate of travelling must have been about seven miles per hour. We further know that the course or track of the Cyclone was N. 22½° E. We must now see what light these results will throw upon points previously determined by hypothesis, the accuracy of which requires testing, I mean with regard to the assumed position of the Cyclone's vortex at noon of the 21st, and its estimated diameter: its rate of travelling, we say, was seven miles per hour; this, however, is only based upon the assumed course and distance of the Cyclone during twenty-four hours; we must, however, try and get some corroborative evidence or facts which will uphold the argument we have

advanced. There is one point yet untouched, which I think will supply us with the corroborative information required. On looking at the Diagram, we see that the circumferential limits of the Cyclone at noon of the 21st of November last was ninety miles distant from the Bombay Observatory, and that the course of the Cyclone showed it to be travelling nearly dead on to us. The correctness of its rate of travelling can be proved by our knowing the hour at which the Cyclone reached Bombay. This information I am happily in a position to give you, and thus clear away the misty doubts which always hang over hypothetical discussions.

At midnight of Saturday the 21st, when the Observatory at Bombay was closed for the week, the next day being Sunday, there was no gale then; the barometer read 29.90; there was just a pleasant breeze from the South East, with overcast suspicious-looking weather, as is customary, at this season of the year. About one o'clock, or an hour after midnight, the first burst of the Cyclone struck the Observatory, making the doors and venetians bang about, and the trees to rustle and shake again. The noise awoke me at once, and I immediately got up and looked at the clock and the barometer; the former showed ten minutes past one o'clock, and the latter stood at 29·82. A look round at the weather at once convinced me that a Cyclone was paying us a passing visit.

Now the fact of the Cyclone having reached Bombay at one hour after midnight, or in other words, thirteen hours after noon of the 21st of November, proves that our assumed rate of its travelling was correct to almost a fraction, and any trifling discrepancy of a few minutes may be accounted for by the difference of longitude between Bombay Observatory and the Cyclone's vortex at noon of the 21st of November. The correctness of our estimated rate at which the Cyclone was travelling having been established, we can look with entire confidence on our estimated distance from its circumferential limits or border at noon of the 21st of November, and further that the diameter assigned to it must have been also correct, or at least as near the truth as we have the means of discovering by the Law of Storms.

At noon of the 23rd the Cyclone had died away, leaving us with a light North-Westerly wind, which showed that it had passed inland to the northward of Bombay. There is no doubt that the Cyclone must have curved its course after noon of the 22nd instant, as shown in the diagram, for as we had the wind continually from seaward on that day, we were enabled to point out at any hour the direction in which the

Cyclone's vortex lay. In addition to this, we know from the log of the *Hamoody*, which was in latitude 20° 20′ North, and longitude 69° 39′ East, at noon of the 23rd (*vide* No. 20 on the Diagram), that she was then experiencing the last of the Cyclone with a northerly wind, showing that its vortex was due East of her; and from Gogo we learn that, at noon of the 23rd, they had the last of the Cyclone from the North-East. These data enable us to fix approximately the position of the vortex at noon of the 23rd, as shown in the Diagram.

How far it travelled inland, or whether it broke up on coming in contact with the mountain ranges inland, we have no data to tell, although we know that, as a general rule, contact with *terra firma* often proves fatal to the existence of a travelling rotatory storm.

I have now done with the Cyclone as regards its track to the northward of Bombay, and have laid down its approximate course to noon of the 23rd, as shown in the Diagram; I must now go to the southward, and see what traces we can find of our visitor in still lower parallels of latitude. I am sorry, however, to say that the data which have as yet reached me regarding the Cyclone further south, will not, I fear enable me to trace it with very great accuracy, and therefore this portion of its track will be open to correction when further data come to hand.*

The vortex data for noon of the 20th of November are derived from the logs of three vessels then in a gale at sea, and are as follows:—

Number on the Diagram.	Vessel's Name.	Latitude North.	Longitude East.	Direction of the Wind, corrected for Variation and Deviation.
21	Good Success	12° 50′	74° 00′	South-Easterly.
22	St. Palhmon	13 54	68 13	East North-East.
23	Pearl	12 45	74 45	South-Easterly.

The fact that two of the above ships were distant from each other more than 390 miles, and on different sides of the vortex, makes the data though few, worthy of reliance; and by them we find that the vortex of the Cyclone, at noon of the 20th, was in latitude 9° 50′ North, and longitude 70° 06′ East, and that its diameter was about 600 miles.

* Subsequent data prove the track was laid down correct.

The vortex data, for noon of the 19th, are derived from the logs of four vessels then in a gale at sea, and are as follows:—

Number on the Diagram.	Vessel's Name.	Latitude North.	Longitude East.	Direction of the Wind, corrected for Variation and Deviation.
		° ′	° ′	
24	Earl Clare	11 24	75 30	Light S. E. gale.
25	Good Success	11 05	75 00	Ditto
26	China	8 45	76 00	South South-East.
27	Her Majesty	4 05	76 15	South-Westerly.

The first two vessels had the gale very lightly, and they serve to indicate the direction of its vortex; but it appears that owing to strong south-easterly breezes being usual at that season of the year, between Cochin and Mount Dilly, they did not suspect that a Cyclone was traversing the offing.*

The vortex data of the 19th of November give its position in latitude 6° 40′ North, and longitude 73° 00′ East.

From the foregoing results we are enabled to state that from noon of the 19th to that of the 20th the course or track of the Cyclone was N. 40° W. The distance travelled by it was 255 miles, and its speed ten miles and a half per hour; and that from noon of the 20th to that of the 21st, its course and distance was N. 15° W. 405 miles, and its rate of travelling was about seventeen miles per hour.

The Cyclone appears to have had a larger diameter on the 20th than on the previous and following day, no doubt caused by its contact with the numerous islets parallel to the coast.

All these peculiar features and changes in its dimensions and rate of travelling are in accordance with the accounts given by Captain Piddington, who found the same to occur in his numerous researches on the subject of Cyclones.

* A letter received since from Cochin states that no Cyclone was experienced there, as the freshness of the breeze was considered by no means unusual at that season of the year, although the weather looked suspicious. This tends to prove the correctness of the Diagram.

Looking at the entire track of the Cyclone from noon of the 19th to noon of the 23rd, I am of opinion that it travelled in the form of an ellipse, as shown on the Diagram by a broken chain line; and I think there are grounds to suppose that the Cyclone must have been severely felt amongst the Laccadive and the northern portion of the Maldive Islands, as its track lay in such proximity to them. One remarkable feature in this Cyclone was the great quantity of rain which accompanied it. All the vessels note this fact particularly: in some of the log-books it is said to have been "heavy rain," in others "incessant rain," and in another "blinding rain," as if the South-West monsoon had taken a fit into its head and come back again. Another remarkable feature is the absence of electricity (or thunder and lightning), and another, the remarkable suspicious swell which preceded and followed it, with its strong phosphoric tendency at night-fall, giving sufficient light to read a book up aloft, and I am very much afraid that that treacherous swell* was in some measure connected with the loss of the P. and O. Co.'s Steamer *Columbia* on Minicoy Island at daylight of the 19th. It is curious also to observe that a little steamer like the *Palhmon*, of only 73 tons burden, though right in the vortex of the Cyclone, came safely through it, whilst the unfortunate *Cecrops*, more than five times her size, was all but lost.

I must now conclude, having traced the course of this remarkable Cyclone for four successive days, over a distance of more than a thousand miles, and at last yielding and dispersing itself before the mountain barriers of the continent of India.

Before I sit down, I have to acknowledge that the whole of the data and log-looks, by which I was enabled to trace the course of the Cyclone, were procured and placed at my disposal by Captain Barker, the Master Attendant of this port, and by the Secretary of this Society, Mr. Kennelly, I.N., for which I beg to tender them my best thanks.

* This has been fully confirmed in a letter from the Captain of the *Columbia* received since.

Abstract of Meteorological Observations made during the voyage of the Steamer "Punjaub," from the 29th

Date 1860.	Ship's Barometer.		Aneroid Barometer.		Thermometer in the Air.				Wet Bulb.		Temperature of the Sea.	Rain.
	10 A.M.	4 P.M.	10 A.M.	4 P.M.	6 A.M.	1 P.M.	Max.	Min.	6 A.M.	1 P.M.		
Augt.	°	°	°	°	°	°	°	°	°	°	°	
29	29·88	29·78	30·02	29·92	82	84	84	80	77	78	83	Slight showers.
30	29·87	29·77	29·98	29·89	80	81	81	77	76	75	82	Frequent do.
31	29·87	29·78	30·01	29·90	78	81	82	76	75	77	81	Ditto
Sept.												
1	29·93	29·81	30·04	29·92	78	80	81	74	73	76	80	Ditto
2	29·87	29·77	30·00	29·89	78	83	83	75	74	77	80	One shower.
3	29·87	29·78	30·02	29·90	79	82	82	78	75	76	80	Squally with rain.
4	29·86	29·76	30·00	29·88	80	83	83	78	75	76	80	Ditto
5	29·85	29·77	30·02	29·90	81	82	83	80	76	77	80	No rain.
6	29·92	29·83	30·06	29·97	81	83	83	80	76	77	81	Ditto
7	29·93	29·83	30·08	29·98	81	83	84	80	76	78	82	Shower at 4 A.M.
8	29·94	29·83	30 08	29·98	82	86	86	80	77	78	82	None.
9	29·95	29·87	30·10	30·02	81	85	87	81	76	78	82	Ditto
10	29·98	29·85	30·14	30·02	82	85	85	79	78	78	82	Ditto
11	29·97	29·83	30·13	30·02	79	82	82	77	75	77	81	Ditto
12	29·98	29·88	30·16	30·05	78	80	80	76	74	75	79	Ditto
13	30·01	29·95	30·18	30·11	76	78	78	71	73	75	79	Passing showers.
14	30·05	29·95	30·28	30·19	75	76	77	72	71	71	76	Ditto
15	30·05	29·97	30·28	30·20	73	82	82	71	68	67	75	Ditto
16	30·08	29·97	30·28	30·21	71	73	78	71	66	67	75	Ditto
17	30·15	30·10	30·38	30·27	71	74	75	73	65	68	75	Ditto
18	30·17	30·06	30·38	30·26	73	78	78	73	64	67	73	None.
19	30·13	30·07	30·32	30·27	71	82	82	69	66	67	73	Ditto
20	30·07	30·00	30·28	30·18	69	81	81	70	63	70	73	Ditto
21	30 05	29·98	30·27	30·19	70	82	82	69	69	70	74	Ditto
22	30·03	29·95	30·30	30·20	69	77	77	73	67	64	75	Ditto
23	30·08	30·02	30·30	30·21	73	79	79	73	66	70	76	Slight shower.
24	30·07	29·98	30·28	30·20	73	79	79	73	70	72	76	Showery.
25	30·05	30·00	30·26	30·16	72	78	78	72	70	71	76	Heavyshower A.M.
26	30·05	29·97	30·24	30·17	72	79	81	72	70	72	76	None.
27	30·04	29.96	30·20	30·10	75	81	81	75	70	72	77	Ditto
28	30·05	29·95	30·21	30·08	76	79	80	72	72	74	78	Slight shower.
29	30·05	29·92	30·20	30·06	76	80	85	71	76	74	78	None.
30	30·03	29·91	30·20	30·08	74	85	86	74	72	75	78	Ditto

Muscat-Zanzibar Commission to and from Zanzibar, in Her Majesty's August to the 30th September 1860.

Winds.		Latitude North & South.	Longitude East.	Course and distance in Miles.		General Remarks.
Direction.	Force.				miles.	
Westerly.	2	16°47′ N.	72°27′	S. 9°40′	W. 125	Nimbi and cirro-cumuli. Lunar halo.
Variable.	1 to 2	14·13	73·36	S. 22·	E. 167	Nimbi, cirri, and cirro-stratus.
Westerly.	2	11·45	74·40	S. 23·	E. 161	Nimbi and cirro-stratus.
N. W.	3	9·20	76·13	S. 32·	E. 168	Heavy rain during night. Cirro-cumuli.
Ditto	3 to 4	7·07	78·07	S. 40·38	E. 175	Nimbi and cirro-cumuli.
W.S.W.	3 to 4	In Galle Harbour.				Cloudy. Frequent squalls with rain.
W.S.W.	3 to 4					Nimbi and cirro-cumuli.
W.S.W.	3 to 4	5·29	80·12	South	29	Cirri and cirro-cumuli.
Westerly.	3 to 4	3·11	80·00	S. 4·29	W. 138	Rich blue sky and sea, with cirri.
W. to W.S.W.	3	0·49	79·42	S. 7·13	W. 143	Do. do.
S. W. calm.	1	1·36 S	79·00	S. 16·	W. 151	Do. do. with cirri and cirro-cumuli.
Calm to W. S. W.	1	3·37	77·35	S. 35·	148	Light cirri and cirro-cumuli.
S.S.W. to S. by E.	1 to 3	5·17	76 02	S. 43·	W. 138	Nimbi, cirri, and cirro-cumuli.
S.S.E.	3 to 4	7·30	74·17	S. 37·49	W. 168	Light cirri and cirro-cumuli.
Ditto	3 to 4	9·38	71·39	S. 50·44	W. 202	Cirri and cirro-cumuli.
S.E.	3 to 4	11·52	69·01	S. 49·	W. 206	Nimbi, cirri and cirro-cumuli.
Ditto	4 to 5	13·49	65·47	S. 58·16	W. 222	Do. do.
Ditto	4	15·55	63·40	S. 48·	W. 189	Do. do.
Ditto	3	18·09	60·56	S. 46·	W. 192	Do. do.
Ditto	3	19·52	57·48	S. 60·	W. 206	Do. do.
At anchor in Port Luis, Mauritius.						Do. do. Do. do. Do. do. Do. do.
S.E.	3 to 4	18·14	56·02	N. 36·	W. 122	More cloudy, cirri and cirro-cumuli.
Ditto	2 to 4	16·06	54·00	N. 44·30	W. 175	Stratus and cirro-cumuli.
Ditto	2 to 3	13·51	52·01	N. 40·22	W. 177	Do. do.
Ditto	3 to 4	11·40	49·37	N. 47·	W. 192	A.M. nimbi and cirro-cumuli, P.M. cloudless.
S.E. to E.	4	10·23	45·58	N. 70·	W. 227	Do. do.
Ditto	2 to 3	8·44	42·59	N. 61·	W. 203	Light cirri and cirro-cumuli.
Easterly.	..	7·07	40·22	N. 58 02	W. 183	Do. do.
Ditto	..	At anchor in Zanzibar Harbour.				Do. do. and lunar halo.
Calm and variable.	..					Cirri and cirro-cumuli.

(Signed) J. WELSH,
Assistant Surgeon

Abstract of Meteorological Observations made during the voyage of the Steamer "Punjaub," from

Date 1860.	Ship's Barometer.		Aneroid Barometer.		Thermometer in the Air.				Wet Bulb.		Temperature of the Sea.	Rain.
	10 A.M.	4 P.M.	10 A.M.	4 P.M.	6 A.M.	1 P.M.	Max.	Min.	6 A.M.	1 P.M.		
Oct.	°		°	°	°	°	°	°	°	°	°	
1	30·02	..	30·18	30·03	75	84	86	75	73	73	78	None
2	..	..	30·16	30·06	77	82	83	76	71	72	78	Ditto
3	..	..	30·16	30·04	77	81	81	76	70	70	78	Showery.
4	..	..	30·24	30·10	76	81	82	76	70	70	78	None.
5	..	..	30·18	30·10	77	82	82	77	72	73	78	Showery.
6	..	..	30·20	30·12	78	80	80	78	72	73	78	One shower.
7	..	..	30·18	30·11	77	80	81	77	71	73	78	None.
8	..	..	30·19	30·11	77	80	81	77	71	72	78	Ditto
9	..	..	30·16	30·07	77	80	80	77	73	74	78	Ditto
10	..	..	30·17	30·09	77	81	82	77	73	84	78	Ditto
	..	..										
11	..	..	30·15	30·06	79	82	83	79	72	73	78	Heavy shower.
12	..	..	30·16	30·06	78	81	84	77	74	74	78	None.
	..	..										
13	..	..	30·15	30·06	79	80	82	79	72	75	78	Showery.
	..	..										
14	..	..	30·20	30·10	76	82	82	76	73	74	78	One shower.
15	..	..	30·22	30·12	77	82	82	77	71	73	78	Showery.
16	..	..	30·20	30·11	79	83	83	79	69	82	78	One shower.
17	..	30°00	30·20	30·10	79	85	86	79	72	73	78	None.
18	30·06	29·96	30·20	30·08	78	84	86	78	73	74	79	Ditto
19	30·05	29·92	30·22	30·12	78	84	85	79	72	72	79	Ditto
20	30·13	29·91	30·20	30·10	79	83	84	79	72	73	79	Ditto
21	29·95	29·82	30·15	30·08	76	82	82	76	71	72	78	Ditto
22	29·95	29 80	30·10	29·98	76	79	80	76	73	74	78	Ditto
23	29·85	29·74	30·03	29·90	74	80	80	76	74	75	78	Ditto
24	29·82	29·72	29·98	29·88	76	75	75	75	74	72	78	Shower.
25	29·85	29·75	30·02	29·93	80	82	82	80	75	77	83	Ditto.
26	29·95	..	30·10	..	80	84	84	76	76	74	83	Heavy rain for one hour.
27	29·82		30·00	29·90	78	83	83	78	74	74	..	None.
28	29·81	29·70	30·00	30·01	76	83	83	76	74	73	..	Ditto
29	29·80	29·70	29·98	29·87	77	86	87	77	65	73	..	Ditto
30	29·78	29·69	29·98	29·86	77	95	95	77	66	74	..	Ditto
31	29·82	29·76	30·02	29·91	79	94	94	79	67	75	..	Ditto

Muscat-Zanzibar Commission, to and from Zanzibar, in Her Majesty's 1st to 31st October 1860.

Winds.		Latitude North & South.	Longitude East.	Course and Distance in Miles.	General Remarks.
Direction.	Force.				
Variable.	..	At Anchor in Zanzibar Harbour.			Cirri and cirro cumuli.
S.E. calm.	..				Light nimbi and cirro-cumuli.
E.S.E. calm.	2 to 3				Stratus and cirro-cumuli.
Ditto	..				Cirri and cirro-cumuli.
Southerly.	..				Nimbi and cirro-cumuli.
Ditto	..				Do. do.
Ditto	..				Cirro-cumuli.
S.W.	..				Do.
Ditto	..				Nimbi and cirro-cumuli.
S.E.	..				Hazy with cirri and cirro-cumuli.
Easterly.	..				Nimbi and cirro-cumuli.
Ditto	..				Nimbi and cirro-cumuli. Cloudless nights.
Southerly.	..				A.M. Hazy, nimbi and cirro-cumuli.
Ditto	..				Do. do.
S.E.	..				Do. do.
Ditto	..				Do. do.
Ditto	..				Do. do.
Ditto	..	7 A.M. left Zanzibar.			Cirri and cirro-cumuli. Lunar halo.
Ditto	..	Anchored at Mombassa at 9 A.M. and left at 7 P.M.			Do. do.
Ditto	2 to 3	2°24′ S	41° 37′	N. 49°29′ E. 154	Light cirri and cirro-cumuli.
S.S.E.	3 to 4	0·24 N	44·44	N. 48·4 E. 251	Cirri and cirro-cumuli. Cloudless nights.
S.W	2 to 3	3·03	48·03	N. 51·22 E. 255	Do. do.
Ditto	4	6·32	50 26	N. 34·15 E. 253	Nimbi and cirro-cumuli.
Ditto	4 to 5	10·34	51·27	N. 13·06 E. 249	Very hazy, Nimbi and cirro-stratus.
S.E.	4	12·35	49·20	N. 87·42 W. 249	Light cirri and cirro-cumuli.
Rotatory.	5 to 6			(to Aden.)	8 A.M. Heavy thunderstorm with much rain.
S E.	Force not noted.	At Anchor in Aden Harbour.			Light cirri. Cloudless nights.
Dttto					A.M. Calm, light cirri, P.M. moderate breeze.
Ditto					Do. do.
Easterly.					Cloudless sky. Intensely hot.
Ditto					Do. do.

(Signed) J. WELSH,
Assistant Surgeon.

Abstract of Meteorological Observations made during the voyage of the Steamer "Punjaub," from 1st

Date 1860.	Ship's Barometer.		Aneroid Barometer.		Thermometer in the Air.				Wet Bulb.		Temperature of the Sea.	Rain.
	10 A.M.	4 P.M.	10 A.M.	4 P.M.	6 A.M.	1 P.M.	Max.	Min.	6 A.M.	1 P.M.		
Nov.	°	°	°	°	°	°	°	°	°	°	°	
1	29·82	29·78	30·08	29·96	78	86	86	70	72	73	..	None.
2	29·90	29·77	30·08	29·96	77	85	85	77	71	73	..	Ditto
3	29·83	29·74	30·02	29·92	78	85	86	78	72	75	..	Ditto
4	29·82	29·72	30·02	29·92	77	86	86	77	71	74	..	Ditto
5	29·83	29·75	30·03	29·96	78	88	88	78	74	73	..	Ditto
6	29·90	29·80	30·07	30·00	77	87	87	77	72	71	..	Ditto
7	29·92	29·80	30·11	29·99	78	88	88	78	72	73	..	Ditto
8	29·94	29·84	30·15	30·04	79	86	86	79	71	70	..	Ditto
9	29·90	29·83	30·08	29·98	77	85	86	77	70	72	..	Ditto
10	29·90	29·80	30·09	29·96	78	86	86	78	70	73	82	Ditto
11	30·00	29·90	30·20	30·12	78	85	85	78	73	75	82	Ditto
12	30·05	29·95	30·27	30·19	78	84	84	78	72	74	82	Ditto
13	30·05	30·00	30·26	30·20	78	81	81	78	71	73	80	Ditto
14	30·07	30·02	30·28	30·14	78	81	81	78	70	72	79	One shower.
15	30·06	29·95	30·20	30·10	78	78	78	78	71	72	79	None.
16	30·04	29·93	30·19	30·10	79	81	81	79	71	73	80	Showery.
17	30·02	27·90	30·18	30·08	78	84	84	78	72	73	80	None.
18	29·97	29·86	30·10	30·01	80	83	83	80	70	72	80	Ditto
19	29·97	29·86	30·11	30·01	79	81	81	79	70	72	80	Ditto

Muscat-Zanzibar Commission, to and from Zanzibar, in her Majesty's *to 19th November* 1860.

Winds.		Latitude North.	Longitude East.	Course and Distance in Miles.	General Remarks.
Direction.	Force.				
Easterly.	..	At Anchor in Aden Harbour.			Cloudless sky. Intensely hot.
Ditto	..				Do. do.
Ditto	..				Do. do.
Ditto	..				A.M. Light cirro-cumuli.
Ditto	..				Sky nearly cloudless, strong breeze and squally.
Ditto	..				A.M. Jebel Shumshum capped. with clouds. P.M. cloudless.
Ditto	..				Cirri and cirro-cumuli.
Ditto	..				Do. do.
Ditto	..				Do. do.
Ditto	..				Do. do.
E.N.E.	2 to 3	12°48′	46°51′	N. 88° E. 104	Do. do. Luminous sea at night.
Ditto	2 to 3	13·33	49·39	N. 75·03′ E. 169	Do. do.
Ditto	3	14·11	52·59	N. 78·05 E. 198	Do. do.
N.E.	2 to 3	11·54	56·26	N. 75·53 E. 205	Nimbi, cirri and cirro-cumuli. Luminous sea at night.
Easterly.	2 to 3	15·48	59·08	N. 70·23 E. 166	Cirri and cirro-cumuli. Luminous sea at night.
Ditto	2 to 3	16·41	62·24	N. 72· E. 194	Nimbi and cirro-cumuli Luminous sea at night.
N.E.	2 to 3	17·27	65·33	N. 75·43 E. 186	Nimbi and cirro-cumuli. Waterspout in distance.
N.N.E.	2 to 3	18·10	68·47	N. 76·36 E. 189	Nimbi and cirro-cumuli.
N.E.	2 to 3	18·47	72·07	N. 79·15 E. 193	Cloudless sky, Anchored in Bombay Harbour at 5 P.M.

(Signed) J. WELSH,
Assistant Surgeon.

Abstract of Meteorological Observations made during the voyage of the Steamer "Punjaub," from the 29th

Date 1860.	Ship's Barometer.		Aneroid Barometer.		Thermometer in the Air.				Wet Bulb.		Temperature of the Sea.	Rain.
	10 A.M.	4 P.M.	10 A.M.	4 P.M.	6 A.M.	1 P.M.	Max.	Min.	6 A.M.	1 P.M.		
Augt.	°	°	°	°	°	°	°	°	°	°	°	
29	29·88	29·78	30·02	29·92	82	84	84	80	77	78	83	Slight showers.
30	29·87	29·77	29·98	29·89	80	81	81	77	76	75	82	Frequent do.
31	29·87	29·78	30·01	29·90	78	81	82	76	75	77	81	Ditto
Sept.												
1	29·93	29·81	30·04	29·92	78	80	81	74	73	76	80	Ditto
2	29·87	29·77	30·00	29·89	78	83	83	75	74	77	80	One shower.
3	29·87	29·78	30·02	29·90	79	82	82	78	75	76	80	Squally with rain.
4	29·86	29·76	30·00	29·88	80	83	83	78	75	76	80	Ditto
5	29·85	29·77	30·02	29·90	81	82	83	80	76	77	80	No rain.
6	29·92	29·83	30·06	29·97	81	83	83	80	76	77	81	Ditto
7	29·93	29·83	30·08	29·98	81	83	84	80	76	78	82	Shower at 4 A.M.
8	29·94	29·83	30 08	29·98	82	86	86	80	77	78	82	None.
9	29·95	29·87	30·10	30·02	81	85	87	81	76	78	82	Ditto
10	29·98	29·85	30·14	30·02	82	85	85	79	78	78	82	Ditto
11	29·97	29·83	30·13	30·02	79	82	82	77	75	77	81	Ditto
12	29·98	29·88	30·16	30·05	78	80	80	76	74	75	79	Ditto
13	30·01	29·95	30·18	30·11	76	78	78	71	73	75	79	Passing showers.
14	30·05	29·95	30·28	30·19	75	76	77	72	71	71	76	Ditto
15	30·05	29·97	30·28	30·20	73	82	82	71	68	67	75	Ditto
16	30·08	29·97	30·28	30·21	71	73	78	71	66	67	75	Ditto
17	30·15	30·10	30·38	30·27	71	74	75	73	65	68	75	Ditto
18	30·17	30·06	30·38	30·26	73	78	78	73	64	67	73	None.
19	30·13	30·07	30·32	30·27	71	82	82	69	66	67	73	Ditto
20	30·07	30·00	30·28	30·18	69	81	81	70	63	70	73	Ditto
21	30 05	29·98	30·27	30·19	70	82	82	69	69	70	74	Ditto
22	30·03	29·95	30·30	30·20	69	77	77	73	67	64	75	Ditto
23	30·08	30·02	30·30	30·21	73	79	79	73	66	70	76	Slight shower.
24	30·07	29·98	30·28	30·20	73	79	79	73	70	72	76	Showery.
25	30·05	30·00	30·26	30·16	72	78	78	72	70	71	76	Heavyshower A.M.
26	30·05	29·97	30·24	30·17	72	79	81	72	70	72	76	None.
27	30·04	29.96	30·20	30·10	75	81	81	75	70	72	77	Ditto
28	30·05	29·95	30·21	30·08	76	79	80	72	72	74	78	Slight shower.
29	30·05	29·92	30·20	30·06	76	80	85	71	76	74	78	None.
30	30·03	29·91	30·20	30·08	74	85	86	74	72	75	78	Ditto

Muscat-Zanzibar Commission to and from Zanzibar, in Her Majesty's August to the 30th September 1860.

Winds.		Latitude North & South.	Longitude East.	Course and distance in Miles.	General Remarks.
Direction.	Force.				
		° ′	° ′	° ′ miles.	
Westerly.	2	16·47 N.	72·27	S. 9·40 W. 125	Nimbi and cirro-cumuli. Lunar halo.
Variable.	1 to 2	14·13	73·36	S. 22· E. 167	Nimbi, cirri, and cirro-stratus.
Westerly.	2	11·45	74·40	S. 23· E. 161	Nimbi and cirro-stratus.
N. W.	3	9·20	76·13	S. 32· E. 168	Heavy rain during night. Cirro-cumuli.
Ditto	3 to 4	7·07	78·07	S. 40·38 E. 175	Nimbi and cirro-cumuli.
W.S.W.	3 to 4	In Galle Harbour.			Cloudy. Frequent squalls with rain.
W.S.W.	3 to 4				Nimbi and cirro-cumuli.
W.S.W.	3 to 4	5·29	80·12	South 29	Cirri and cirro-cumuli.
Westerly.	3 to 4	3·11	80·00	S. 4·29 W. 138	Rich blue sky and sea, with cirri.
W. to W.S.W.	3	0·49	79·42	S. 7·13 W. 143	Do. do.
S. W. calm.	1	1·36 S	79·00	S. 16· W. 151	Do. do. with cirri and cirro-cumuli.
Calm to W. S. W.	1	3·37	77·35	S. 35· 148	Light cirri and cirro-cumuli.
S.S.W. to S. by E.	1 to 3	5·17	76 02	S. 43· W. 138	Nimbi, cirri, and cirro-cumuli.
S.S.E.	3 to 4	7·30	74·17	S. 37·49 W. 168	Light cirri and cirro-cumuli.
Ditto	3 to 4	9·38	71·39	S. 50·44 W. 202	Cirri and cirro-cumuli.
S.E.	3 to 4	11·52	69·01	S. 49· W. 206	Nimbi, cirri and cirro-cumuli.
Ditto	4 to 5	13·49	65·47	S. 58·16 W. 222	Do. do.
Ditto	4	15·55	63·40	S. 48· W. 189	Do. do.
Ditto	3	18·09	60·56	S. 46· W. 192	Do. do.
Ditto	3	19·52	57·48	S. 60· W. 206	Do. do.
At anchor in Port Luis, Mauritius.					Do. do. Do. do. Do. do. Do. do. Do. do.
S.E.	3 to 4	18·14	56·02	N. 36· W. 122	More cloudy, cirri and cirro-cumuli.
Ditto	2 to 4	16·06	54·00	N. 44·30 W. 175	Stratus and cirro-cumuli.
Ditto	2 to 3	13·51	52·01	N. 40·22 W. 177	Do. do.
Ditto	3 to 4	11·40	49·37	N. 47· W. 192	A.M. nimbi and cirro-cumuli, P.M. cloudless.
S.E. to E.	4	10·23	45·58	N. 70· W. 227	Do. do.
Ditto	2 to 3	8·44	42·59	N. 61· W. 203	Light cirri and cirro-cumuli.
Easterly.	..	7·07	40·22	N. 58 02 W. 183	Do. do.
Ditto	..	At anchor in Zanzibar Harbour.			Do. do. and lunar halo.
Calm and variable.	..				Cirri and cirro-cumuli.

(Signed) J. WELSH,
Assistant Surgeon.

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